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Memorandum on the Geological structure and Mineral resources of the Singhbhoom Division, South-West Frontier Agency. By Capt. J. C. HAUGHTON, late Assistant to the Governor-General's Agent in the South-West Frontier.

In order to clearly understand the Geology of the country to which this memorandum refers, it appears desirable to allude also to the principal geographical features connected with it, as they present themselves.

To the North West lies the table of Chota Nagpore, the general level of which is between 1,200 and 2,000 feet above that of the sea. The base of this table-land appears to be gneiss, passing in some places into granite. It is usually covered by quartz, gravel, and ferruginous clay. The gravel has the appearance of being formed on the spot from the disintegration of quartz, its chief component, and except in the beds of streams, is not rolled.

The gneiss in many places, rises into domes and conical hills of no great elevation. These are occasionally giant masses of solid rock, which must have been protruded in a semi-liquid state. In other instances they consist in huge fragments promiscuously heaped together, as though the upheaval of the rock were accomplished by sudden violence, applied after it had become consolidated. The quartz is often found almost alone, and frequently contains large crystals of schorl.

The tableland of Chota Nagpore gives rise to the Damooda flowing South East into the Hooghly and the Sooburno Rekha and

Bamunee, flowing more Southerly into the Bay of Bengal, the sources of which rivers or their tributaries, are all within a short distance of the station of Chota Nagpore. The table-land extends in a North East direction from Ruttunpore* of (great) Nagpore through Juspore, the North West extreme of Singhbhoom, Tamar and Pachete to the Trunk Road East of Purusnath, the Southern termination of it is generally rather abrupt from Ruttunpore to the neighbourhood of Singhbhoom, where lofty ridges stretch South from it. Again it resumes its character in Tamar, where it is marked by the rivers Kanchee and Kurkuree, tributaries of the Sooburno Rekha. Further East the terminations appear to be more gradual. The Southern slope is generally covered with jungle, consisting of sal and other trees common to Bengal, intermixed with bamboo of a description which does not attain any great size.

South East of the table-land above described, schists, slates, old sandstones and others, which may all be called metamorphic rocks, are met. The appearance of these rocks varies greatly according to their proximity to the igneous rocks which underlie, overlie, or pierce them. Below the table-land, gneiss ceases to be the principal rock, but still occasionally shows itself. It is seen as far East as the neighbourhood of Bancoora, and South to the frontier of Mohrbunj in the tributary mehals, possibly further. The quartz gravel still abounds, and is in many places so rich in iron as to be smelted. In other places the quartz appears to be entirely replaced by oxide of iron and nodular or magnetic iron ores.

In this region the metamorphic rocks are every where pierced with dikes of green stone trap and allied rocks, most of which are extremely rich in iron. This fact I learnt to my sorrow from numerous triangulations made with a view to the compilation of a map during my tours in the district, having been rendered useless by the effect of local attraction on the magnetic needle, which I had not leisure to investigate. The greenstones disintegrate into a rich ferruginous earth, containing a black iron sand which is attracted by the magnet. The greenstone hills are generally long dikes running in a Northerly and Southerly direction, and are chiefly of little altitude; but in some places they attain a considerable elevation.

* 1,539 feet above the sea. °

The Baghmoondie trigonometrical station which is on one of these hills, is, by the boiling point of water, about 1200 feet above the sea. The rock of this hill shows a disposition to columnar form. I was much puzzled to account for the sharp angular appearance, which the blocks forming the surface of these hills exhibit; the more, as in many instances the fracture was recent. Careful observation showed that these very hard masses had split of themselves, by the unequal contraction of their parts when, after being heated by the sun, they were suddenly cooled by heavy rain.

The metamorphic formation appears to extend South to Sumbulpore and Goomsoor, having basins in it containing secondary strata and coal formations. One of these appears to occupy the territory of Deknal in the tributary mehals, and another to extend from Gangpore South Westerly through the North of Sumbulpore towards Ruttunpore. The existence of coal in the valley of the Hutsoo (Husdah) has long been known. I have found it also in the bed of the Mand at Chunderpore; both these streams are tributaries of the Mohanuddy. The Gangpore coal formation is probably connected with that of Sirgooja and Palamow; but on this point I have no reliable data. To return however to a more particular account of the country which I am desirous to describe. I may observe that hills of metamorphic rocks of various elevations, seldom beyond 1200 feet, run Southerly from the table-land of Chota Nagpore, dividing Singhbhoom from Gangpore and Bunnye, another spur of the same range runs Easterly dividing Tamar and Patcoom from Singhbhoom. This range slopes down gradually to the Sooburno Rekha. There are some corresponding ridges east of that river, but these are intersected by Dulma, the rival of Purusnath, which lies Southerly from Pooroolea and stretches still further South, sending off spurs in various directions. This hill exteriorly at least, appears to be composed of metamorphic rocks. It attains a height of 3,049 feet. Smoke is said to issue from a fissure at the top, but the information I possess on this point is very vague. South of Dulma are hills of the same class of rocks of inferior height; these however abound in mineral wealth; some assume an Easterly and Westerly direction for instance, the range of Bellipeharee and the Dhoba range; others, as the Ranga Mittee range, run North and South.

The latter attains considerable height, and divides the estate of Dhulbhoom in half, joining the high hills of Mohrbunj to the South.

In the South of the Colehan, a table-land rises rather abruptly to the height of about 1000 feet above the level of the sea. This table declines gradually to the West, South and South East. In the latter quarter it joins the base of the high mountain Badam in Mohrbunj. This table is composed of gneiss, greenstone and metamorphic rocks. It is for the greater part cultivated, and was formerly the site of many populous Hindu villages, from which the inhabitants were expelled by the Coles.

The river Byturnee collects the drainage of this table to the South West and the Khurkhy to the East and South East; the former flowing South East into the Bay of Bengal and the latter North Easterly into the Soburno Rekha. The Baminee (not the Byturnee, as shown in most maps) receives the waters of the Western portion of the district as the Suburno Rekha does, the whole of those of the Eastern portion.

Eastward, in Dholbhoom beyond the Sooburno Rekha, hills gradually disappear; the surface of the country exhibiting undulations which imperceptably merge into the plains of Midnapore. The soil in the more elevated portions of these undulations, consists of Laterite abounding in iron. A variety is extensively smelted for that metal.

To the north-east the hills cease more gradually and extend further to the eastward, but they appear to be succeeded by the same laterite soil as to the south.

It will be seen from what has been said, that the Singhbhoom division is a very hilly country consisting geologically of rocks either of igneous origin or of slates, schists and old sand stones more or less altered by the action of heat.

In such formations minerals are commonly found, and this district forms no exception to the general rule. The metals known to exist are gold, copper, bismuth, and iron; the existence of tin is believed, but the ores require further examination.

To the above list may be added the other mineral products useful to man. These are, as far as yet known, potstones, ochreous earths, and corundums. I propose to detail the localities in which each

mineral is found, adding such information regarding their production as appears likely to be serviceable.

Gold.

This metal is found in almost every river and stream in the country. The apparent exceptions are those which flow almost entirely over igneous rocks. I cannot learn that the metal is found any where in the Khurkhy, and an attempt to extract it from the sands of that river made under my direction failed. The sands of the Roro and its other tributaries were not known to contain it; but on examination a small quantity was extracted from the sands of the Roro and Eleegara by people deputed for the purpose.

I believe gold is found in most parts of the Sooburno Rekha, from the point where it quits the gneiss formation, till it falls into the Bay of Bengal. I know certainly that it is found so low as Kamerara, on the boundary of Dholbhoom and Mohrbunje.*

Gold is found on the surface of the soil at Arabhanga and other places among the wild jungles of Sarunda; in Anundpore, at Badea in Dholbhoom close to the old copper diggings, and probably in other places. There is a tradition of a mine in the jungles of Porahat, from whence large quantities are said to have been formerly extracted. This mine is stated to have been driven horizontally from the bed of a nulla into a hill, it is now said to be completely choked with rubbish. I have seen specimens of the gold from the stream close by, which would lead to the belief that the original source was not far off, the gold being often in short wiry threads, or in little rings. All I had from this source I made over to Mr. Robinson when in this quarter, more is not procurable in the rains.†

* An account of the process of gold-washing at Heera Khund on the Muhanuddee is given by the late Major Ouseley. Journ. Vol. 8, p. 1057—Eds.

† Mr. Robinson's own account of his operations in this country is given in a letter of his dated Rauchee, 20th December, 1849. The following are extracts from it.

“I now want to call your attention to another subject. *Gold Mines*—real genuine gold mines. I enclose you the copies of the Official Papers about them, and proceed to add my testimony on the subject, as also some aspirations. When I came up here last year, I went on with M—— to see the mines, visiting every place where they existed, and a most extraordinary sight it was—they are real mines with shafts sunk down to them varying from twenty to sixty feet in depth,

Gold is found in situ near a slight eminence a little north Assuntullea in Khursowa, to the west of the road. It cannot however be very plentiful, as few take the trouble to look for it. This spot is well worthy of a careful examination, as being the highest in the

all very close together because the people are afraid to run galleries under ground, in some places the old shafts are so numerous that I can only compare the country to a gigantic rabbit warren, and they must have been sunk nearly 100 years ago notwithstanding which the soil in which the gold is found is as abundant as ever; in some places where the ground is cut by rivers and nullahs, it outcrops in the banks, but these are not numerous, the shafts being the chief resource. The gold is found in several sorts of soil, a blue clay; a red clay of a very singular description, and a yellow clay full of large gravel or stones. The gold is separated from the soil by washing in wooden troughs, the principle being exactly the same as that of the *cradle* used in California, only without the slight aid of machinery applied to that plan. Another plan and a very remarkable one, in which the people collect the gold, is by drawing up small water-courses before the rains, so as to make places for a deposit of soil carried down by the water: this soil is cleared out several times, and in it is found a large deposit of gold, proving that it exists all over this particular tract of country in large quantities. I believe that the formation of gold is still very little understood, and from my observation am convinced that it takes place only in small particles, and in particular combinations of soil; by the action of water these particles may become collected in larger or smaller quantities in certain places, but I believe generally the gold is found where it was formed: these mines at such a depth as 60 ft. underneath jungle, and over such a large extent of country, render any other supposition very improbable. It is impossible to arrive at any estimate of the total annual produce of all these mines, because the gold is carried away by native mahajuns who exchange rice, salt, &c. for it, in such an infinity of directions, and the people themselves are far too primitive and ignorant to be able to give any idea upon this point. That it must be large however is certain, from the comfortable appearance of the people, and from the abundance of gold possessed by all the Rajahs, Zeminders, and other wealthy men all over the country; the regular price at which the people who work in the mines will sell the gold is Rs. 10 per tolah (R. 1 weight) but they much prefer exchanging it for rice, salt, ghee, cloth, &c.

My journey extended as far as Robhobe in Oodipore 220 miles hence, and finding that place was best adapted to an experiment on a small scale, water being abundant from the river Soane, I left M. there and returned here, when I got a lease of the village with liberty to work the mines from Government for seven years. The result of this trial I found to be, that basing it on a simple calculation of labour, a man to whom I paid 1 anna per day, produced me between 3 and 4 annas worth of gold, and of course this return could be increased materially, by

immediate neighbourhood, the metal must be derived from the rocks which there are just obtruded from the soil.

It is very difficult to estimate at what rate the metal might be produced, as it is seldom searched for, except to order. The Ghassees,

the employment of some simple machinery for increasing the quantity of earth that a given number of men could wash in a day, and by the economy of labour arising from a well organised system of employing the men. My gold I sent down to Calcutta where it was assayed at the mint, and proved of the value of Rs. 14½ per tolah a price at which I afterwards sold it in the bazar. Robkobe however being in the very heart of the jungles, and very low, proved so intensely hot and unhealthy that M. was obliged to come in here sick, and I had to give up the works, for I am sure no European could live there. Even this country is as little known as any in India, but 150 miles of my journey, was where a *European had never been seen before and a white face was a wonder to the people*, you need not therefore wonder that the riches of the country are at present totally unknown except to very few. Mr. Williams the Geologist was on his way to visit it when he was taken ill and died at Hazarebagh 40 miles hence. Now I want you to consider the following. The *best mines* are in Jusspore about 100 miles hence, 4 days march, where the country and climate are very fine indeed, and I am quite sure that a very fine thing could be made of working them if a capital of Rs. 40,000 and Rs. 50 000 could be raised for the purpose. The late Rajah Ram Singh worked them for a short time, and it is known well that their produce was very large. Unfortunately however from some ill construction, one of the shafts fell in, killing a number of people, and he was obliged to give them up for a time: his death occurred shortly afterwards, and his son Pertab Narain Singh the present Rajah, is one of those individuals, who considers doing any thing for profit a degradation, and beneath his dignity. I applied to him through Colonel Ouseley for pottahs of the mines, but he replied by saying that they were let up to the end of the present settlement and he could not give them; he is very averse to Europeans doing any thing in his country, and did his best to thwart my plans in many underhand ways: however the settlement expires next year, and it is then the intention of Government to reserve the minerals to themselves. I have had some correspondence with them on the subject, and they have now referred me to Mr. Crawford the new Agent, Colonel Ouseley's successor. He however has not had time yet to enter into the subject with me, but will do so in February when he returns here from his tour in the district, and I have no doubt I shall be able to get a lease of the mines for a good term of years. *Gold mines* is a very large word, but there is in this case no nonsense about it: I have seen the thing myself, and without stating any Californian ideas, know that these mines must pay splendidly to whoever gets them."

Robkobe is situated on the river Mand an affluent of the Muhanuddee, and is believed to be on the site of Oodeypore of Tassin's Map. 'The largest mine,'

the lowest class in the country, who wash for it, always demand an advance before they will set to work, and at the same time steadily refuse to work by the day, insisting on selling it at a fixed rate to their employer. They can always reckon on earning from three to

says Col. Ouseley in a report to Government in 1847, 'is a quarter of a coss E. of the village. The three houses of gold diggers can only collect one or two ruttees a day.'

'There are six other places where gold is found. In mouzah Kumhar on the Koorja river, in Kauraja, Salga and Byraggy on the sides of the Sungool river at Bakarrama on the banks of the Bburrury river in Baghbehal at Jumergy in one of its Tolas called Pilma or Pimla on the banks of the Mynee river, but at all these places the quality of the gold is inferior (or white gold "Chakha Sona") to that of Robkobe, and there are no gold finders in any of these villages.'

'There is no foreign traffic in gold, the villages exchange rice, &c. with the gold finders of Robkobe, and only in very small quantities, it is sold at one rupee the Masha, or at the rate of ten or twelve rupees a Gold Mohur. It would be desirable to send a person who understands these things, to the place after the rains, from Calcutta, one who is able to judge of the quantity that might by scientific means be realized, (this is not like mere sand washing, it is a "Khan" or mine, and may prove to be invaluable:)'

'In a letter dated a month later Col. Ouseley calls attention to the surprising difference between a third supply of Robkobe gold dust which he was then sending to Government, and the dust generally washed from the sands of a river.

'The latter description consists invariably of minute lamina, as if in its passage among the rocks, stones and gravels of the river, it had been hammered into thin scales, this dug from the matrix, it is observable—is in granules of various forms—it is also of a richer hue.'

Subsequently Col. Ouseley sent eleven rupees weight of gold from Phursabehal in Juspore a fief of the Srigooja State, and about fifty miles from Robkobe. Here also the gold is dug for, not washed—each village is bound to pay a certain weight of gold annually to the Rajah, the Thekadars buying from the diggers and paying them for it in rice. Villagers from the adjacent States also buy gold here.

Mr. Dodd's assay report on the first supply from Robkobe was as follows, showing the gold dust to be exactly of standard quality.

Gold.	Silver.	Alloy.	Total.
91,667	3,646	4,687	100,000

A second report dated August 1847, is after assaying some melted lumps as well as dust.

Table exhibiting the results of assays on the 3d supply of gold dust, and the 2d of lumps forwarded by Lieut.-Col. Ouseley, Governor General's Agent S. W. Fr. from the mines of Robkobe and Phursabehal.

four pice per day, and I am assured that a vigorous man often gets as much as twelve annas, which, as the ordinary rate of field labourers' hire is about one pice, must be considered a very large sum.

The metal was found some years ago in considerable lumps in the Sona Nuddee of Sonapet in Tamar, on the northern extremity of Singhbhoom; and much is still found there; but the lucky man who got the "Nuggets" is believed to have kept his secret to himself.

Quantity re- ceived.			Pure Contents.			Assay.	Intrinsic produce in Tolas, or new standard of Gold Mohur.
			Base al- loys.	Silver.	Gold.		
1	2	6	4,047	8,062	87,891	3 $\frac{5}{8}$ Ws.	95,888
0	8	0	....	7,031	92,969	1 $\frac{1}{4}$ Bt.	101,420
10	14	0	....	12,079	88,021	3 $\frac{1}{2}$ Ws.	96,023

And a third report dated November of the same year gives the following results.

Certificate of the outturn of gold lumps and dust received from Lieut.-Col. J. R. Ouseley, Governor General's Agent, S. W. Frontier, through C. Beadon and A. R. Young, Esqs. Under Secretaries to the Government of Bengal, as per their letters dated the 31st March, 23rd June, 4th and 11th August, 1847, on account of the East India Company

Mint Regr. No.	Description.	Tale.	Weight in Tola's.			Assay.	Assay produce in Gold Mohurs.		
1847. 27th Aug. 545	A gold Ingot from gold lumps and dust,.....	..	12	0	3	1 $\frac{7}{8}$ Br.	12	4	4
			12	0	3				
						Gold Mohurs.	12	4	4 or
						Co.'s Rs	184	1	0

(Signed) PEAREE MOHUN SEN,
Bullions Keeper.

(Signed) W. N. FORBES,
Mint Master.

The gold of Sonapet is considered the best. The price varies from ten to seventeen Rs. per tola. I think it probable that a much greater amount might be extracted, and great labour saved by treating the residuary sand, found after the coarse gravel is got rid of with mercury; I have collected some of the sand that this question may be decided; also with a view to examination, for other metals which elsewhere are found, to accompany gold.

The process of washing has often been described. A wooden tray like those used by butchers in England and an iron hook to loosen the gravel with are the only implements. The labourer may be seen after his day-work melting the result, with a bamboo tube for a blowpipe, and a little bit of borax as a flux, at a common wood-fire, where several work together they weigh it on the spot and decide the share of each. In Tamar during the dry season numerous parties assemble and dig great pits in the bed of the Kurkuree river, but any thing approaching to a mine, I have not seen.

The spots where gold is found most abundantly are those where the strongest currents of the streams are met by a bank of the river; thus, search would be made at A in the annexed diagram in preference to any other points.

My own belief is, that the precious metal is derived chiefly from the metamorphic rocks, i. e. slates and schists which have been altered by the action of fire. The natives do not appear to have any suspicion as to its source, and I have not heard of any instance in which the metal has been found attached to stone.

Quartz and large quartz dikes abound. I have searched the soil without success in the neighbourhood of some of the largest dikes. The stone itself has yet to be examined.

Copper.

There were vague rumours of the existence of ancient diggings for this metal when I first entered Singhbhoom, but on those spots where it had formerly been found, it had long ceased to be sought for. There was no local tradition as to when, or by whom the diggings had been worked, and it was a matter of doubt whether they were really made for copper. In Seraikela the Zemindar assured me that the metal had not been sought for during the time his family had been settled there, that is for about a century.

In 1847, I ascertained beyond a doubt that the metal existed. A small quantity of the ore was rudely smelted. This gave a little metallic copper. Since then the Zemindar of Dholbhoom and Seraikela have turned their attention to the matter, and some forty or fifty maunds of the metal are now extracted annually during the dry season.

The localities of the veins known to me are Booreetopa in Khursowa, Narainpore and Jamjora, in Seraikela, Landoo, and in fact the whole circuit of the Dhoba hill, Rangamuttee hill, a spot on the south side of the Kapergadee Ghat, Badea, Ooraon Ghur, and a spot near Kamerara, all in Dholbhoom.

The vein in Khursowa lies east and west. It is situated about three miles south of the town and a little northwest of the Moza Booree Topa. The vein has been laid open at intervals for about half a mile, but the diggings are nowhere more than about ten feet in depth. The matrix appears to be schists and quartz. The most promising specimens of the rocks picked up on the spot gave 25 per cent. of metal, but it was so largely contaminated with iron, as to be attracted by the magnet. I think it probable that the vein is now quite as well worth working as it ever was; the operations have been entirely superficial, and it is manifest that a large portion of the vein remains absolutely untouched.

Copper was formerly mined in a hill still called Tamba Doongree,* near Narainpore in Seraikela. The old shafts are very small and irregular. The largest was sixty feet deep. All appear to have been designed to be perpendicular. A very superficial inspection showed that the miners had worked completely at random. The hill consists of schists, in contact with trap; the strike of the strata is No. 86° east, and its dip about 45° north-east, but no regard appeared to have been paid to either. The only rock on which I saw any trace of copper was a trap, or possibly a very much altered schist. No attempt that I am aware of has been made to re-work this vein. The workings, as far as I could ascertain, were entirely vertical, so that the vein must have been quickly passed through, and in such case, would be as good a speculation as ever. The old shafts are about twelve in number.

* Copper Hill.

The Jamjora digging I have not seen. It is said to be entirely new. It is manifestly a continuation of the Dhoba hill vein, or more correctly speaking, part of the same system of veins. The ore is a very promising one. It is very friable, consisting it would seem of a decomposed schist. It contains but little sulphur, which enables the rude operators to smelt it directly, some specimens contain a good deal of bismuth and iron. Those examined by me gave an average of 22 per cent. of copper, sufficiently pure to be marketable.

I have been informed however that some specimens examined by Dr. O'Shaughnessy gave as much as 43 per cent. of metal.

An English gentleman endeavoured in 1852 to obtain a lease of the mines both in Seraikela and Dholbhoom. He was not successful. The Zemindars, on whom I had strongly urged the advantage of employing European skill and capital, objected to me that the "Sahib Logue" once admitted, soon become masters of their estates.

The copper vein at Landoo as I have already remarked, appears to belong to the same system as that at Jamjora, I have not examined the ore, which appears to be more compact than that just mentioned, and probably contains quite as much metal. The present working is I believe new; but I traced round the foot of Dhoba hill with which it is connected the scoria of old furnaces for some miles, all memory of the workers has perished.

About three miles east of Kalkapore in Dholbhoom is a hill called by the Hindoos Rangamittee, and by the Coles, Sontals and others Sengil Booroo; the Cole equivalent for "fire mountain." This hill which consists of altered schists, rises about eight hundred feet above the surrounding country, half way up are perpendicular cliffs of foliated schists which contain copper, and I have ascertained the presence of the metal in an ore of iron taken from the very top of the hill. No mine has been attempted here. Oxide of copper is scraped in small quantities from the surface of the rocks, where water finds its way from above, and is sold in trifling quantities by the natives. The only use to which it is applied, that I could hear of, is for blackening the teeth of the ladies.

At the base of the above cliffs is a fissure, the mouth of which is only just big enough to admit a man's head. It is regarded with

superstitious dread by the inhabitants of the neighbouring villages. When at Kalkapore last year, I through the influence of the Sirdar Ghatwal, collected a party to visit it. It was evident from the stories told, that a visit to it had been a rare event, nothing daunted I climbed the very steep hill at dawn, and with some little difficulty reached the place.

The cavity appeared to penetrate the hill horizontally. As we had no light, I could not ascertain whether it expanded internally or not, for my head closed the entrance. The natives who were with me, could not be induced even to approach it. They asserted that unearthly noises were occasionally heard proceeding from it, and that in some years *after very heavy rain*, fire issued from it. I could not detect the odour of any gas exhaling from it, and the cave itself had no appearance of igneous action about it. A bush was growing a few yards in front, which could not be the case, had a jet of burning gas issued from it within a period of two years. There was a white waxy exudation (which seemed to me to be nitrate of soda) in small quantities on the rocks.

The dung of porcupine and hill-rats showed that the cave was an abode of these animals. The Sirdar promised to send me notice on the next occasion of fire breaking forth, but though we have had some very heavy rain this year, as yet no notice has been given to me.

The mountain undoubtedly contains copper disseminated through a very considerable thickness—at the least some hundred feet of rock. Whether it contain a vein of sufficient richness to repay the labour of working, careful examination must decide.

The copper vein at Badea may be traced for about two miles in a north-westerly direction into the jungles. Its course is shown by a series of pits varying in depth from ten to forty feet. It has not been worked within any traditional period, and trees of large size grow on the edges of the pits. I have not seen any genuine specimen of copper ore from this locality, though fragments of quartz coloured with the oxide of that metal are abundant. A specimen was handed to me from the immediate neighbourhood as containing lead, which it was asserted had been extracted the year before, from the same ore, I failed however to find any trace of lead in it, but think,

that the results warrant me in saying it contains a little tin. My means were very imperfect, and the examination a very hasty one. I have no doubt that Mr. Piddington who has it under analysis, will be able to decide the question. The traces of copper found at the Rangamittee hill I have little doubt are a continuation of the same vein or series which exists at Badea, for the metal is again found at Ooraonghur about four koss north-westerly, and again at an intermediate point near the Kapergadee ghat. I have not visited these places, nor have I any particular description of them. They suffice to show that the metal is found in one right line for about fourteen miles.

The Badea workings would yield as much profit now, as they did originally, the outcrop of the vein having been alone worked and between each pit as much space as occupied by one pit is left apparently untouched. Time did not admit of my clearing the soil sufficiently to ascertain the dip, the strata were as well as I could judge, nearly vertical. The strike determined rudely by the direction of the pits is N. $27^{\circ} 14'$ easterly by compass.

Close to the digging, on the road where the soil has been broken down by carts, small quantities of gold are found amongst gravel consisting of quartz and schist.

Iron is also found near at hand. The ore of the latter is of a sort unique in this quarter.

Two and a half miles north-east of Kamerara are some more old copper diggings. These run in a northerly and southerly direction as those at Badea, for a couple of hundred yards. They are entirely the same in character, some specimens of the ore which were handed to me by Mr. Campbell gave $24\frac{3}{4}$ per cent. of copper. The ore is hard and vitreous, and contains much sulphur with some iron.

The richest veins of copper within the Singhbloom division are apparently those of Landoo and Jamjora; but it is possible the old diggings, if carefully examined, might be found to contain equally good ore. The open workings are liable to be filled with water from the rain, but I think that shafts sunk into the soil would be found to require less drainage than usual. The freedom of the ores in general from sulphur and their softness renders them well worthy of the attention of speculators. Labour is cheap and abundant, and if that on the spot fail, Dhangurs may be had from Chota Nagpore, at

the rate of about Rs. 2 per man per mensem. The Bhoomij of Dholbhoom however often goes to the Mauritius classed as a Dhan-gur. Wood-fuel may be had in sufficient quantity to last eight or ten years near all the localities named. I am unable to say whether coal could be brought at the end of that time at a rate sufficiently low to admit of its use. The Raneegunj collieries are, I think, the only ones which could be thought of for the supply.

From the diggings at Kamerara* there is a good road only 85 miles in length to Tumlook. The distance from Landoo or Jamjora to the Cossye River at Dhee Kullianpore is about 70 miles, and that river might, it seems probable, be available for water-carriage during short periods in the rains, as the Damoodur is, at points far above those where it is ordinarily navigable. There is every facility for the construction of a good road to Dhee Kullianpore or to Midnapore, and in fact there was formerly a Government route in nearly the same direction; the old road from Gurbheta in Midnapore to Sumbulpore, which might possibly be still available for some distance, though it has been abandoned by Government these thirty years. The distance from Tumlook viâ Midnapore would be about 132 miles.

Iron.

This metal is found at almost every mile throughout the district. The localities in which a superior metal is produced are not however numerous. At Bita Booroo, and Narain Bera in Khursawa, several localities in Serai Kela at Neeldee, and Huldee bunnee in Dholbhoom, and two or three places bordering on the Midnapore frontier within the latter estate, where the ore is worked for exportation to Behar, Burdwan and Midnapore. The best metal is from Narain Bera, where a nodular ore is worked; schists, and near Badea a rock seemingly of igneous origin, slightly magnetic, are smelted. The laterite is also used, I believe, towards Midnapore. The ore of Narain Bera is strongly attracted by the magnet. The ironsmiths move about, abandoning rich ores on the failure of a supply of wood, which alone limits the production of the metal.

POTSTONE.

Potstone, which would appear to me a variety of schist, is worked

* 45 miles west of Midnapore.

in very many places. It differs much in quality. Some specimens appear almost indetical with French chalk; the stone of Doobraj-pore in Seraikela is of this sort; others approach English slate in texture, as the stone from Tickree in Dholbhoom; some abound in iron pyrites as the Potstones of Korykela in Porahat and Eleegara in Singhbhoom. Occasionally the rock appears to contain much siliceous matter, as at Arrahanga on the N. Frontier of Khursawa. The Potstone I consider a particularly valuable product, as the mines are inexhaustible. They require little expenditure of capital and but little skill to work, while on the other hand, the demand for the article appears to be only limited by the means of transport, and it may be applied to a great variety of purposes, for which it has not hitherto been used. The profits on the dishes are said to be high. They are valued according to their powers of resisting the effects of heat. The vessels made at Tickree and Darhee in Dholbhoom are the most prized. It will easily be understood how much the trade in a frangible and bulky article, such as this is likely to be increased by the construction of cart roads.

Ochre.

Red Ochre abounds in Pergunah Sarunda in the Government Khass Colehan. It is carried away in all directions in small quantities. In the country, it is chiefly used for imparting a red colour to cloth. It is obtained at the surface without any trouble in digging. Yellow ochre is found in several places in Khursawa, and is also applied to the same use as the red; a white and pink coloured earth from a soft slate or schist is found in several places. The former is used by the Hindu residents for whiteing the walls of their houses, and is sold in the bazar of Chota Nagpore as chalk.

Corundum.

The true Corundum is not, that I am aware of, found anywhere in the Singhbhoom Division, but several varieties of stone applied to the same purposes abound; for want of a better one, I class them under this head.

Garniferous schists exist in several localities, Jamsore in Dholbhoom is the only place known to me, where the mineral is considered hard enough for lac wheels. Here it may be obtained to any

extent from the rock in the bed of the Sooburn Rekha, which is soft and easily broken.

At Khujoorda in Khursawa crystals of schorl are found in a decomposed schist. These are also used in place of Corundum by the native smiths. The supply is unlimited, and they are found at the surface without digging.

At Jugurnauthpore south of Chyebarra, a rock exists, which is much used by the smiths of the country. It appears to be composed of quartz and oxide of iron. The stone is dug out on the banks of an old tank, the waters of which are supposed to give excessive hardness to steel tempered in it. The supply of the stone, obtainable with trifling labour, may be considered almost unlimited.

At Chyebassa near the first bridge over the new road to Serikela, I found a stone reposing on decomposed felspar with dikes of decomposed trap, which was pronounced by the Deputy Commissary of Ordnance to be superior to the last mentioned rock. Both were considered in the Arsenal as too soft for metal-cutting, but the inferior sort from Jugurnauthpore is in general use for the purpose in Singhbhoom. The rock seems to me to be a species of calderite.

A silicious sandstone, much used by the Coles about the station of Chyebassa for tombstones, is highly prized by the sepoy of the Ramgurh Battalion for cleaning their arms, I suppose it to resemble agalmatolite in its qualities.

I have procured what appears to me to be a coarse garnet, some of the crystals of which are as much as two inches in diameter, from Erkee in Tamar on the northern boundary of Singhbhoom. It is supposed to afford a superior article for metal cutting wheels, and is in general demand among the ironsmiths in Chota Nagpore. It is said to be superior to any of those enumerated, and, if we may judge from external appearance, the opinion is not unfounded. It is found on a little rocky eminence east of the village, also in the plain further eastward, and in the jungles of the Raboo Ghat. The supply is unlimited, and the matrix being completely decomposed, it is dug without any difficulty.

I have been induced to mention these stones, as the greater part of Europe and America and even Calcutta is supplied with emery by the petty Grecian island of Naxos. Here we have substitutes

at hand, which if not equal to the produce of Naxos, may at any rate be obtained at a very trifling cost, and will probably answer for many of the purposes to which emery is applied. I fear there is but little ground for hope, that coal may be found any nearer than Pachete, but even should it be discovered within the district, the iron could hardly compete with the produce of Enrope in Calcutta. If found at all, I think it must be looked for in the south-east of the district, where the difficulties which oppose the formation of roads are greatest. I look upon the copper ores, potstone and coloured earths, as the most hopeful sources for speculators. The climate almost forbids any attempt on the part of Europeans to render the gold-washings productive.

In conclusion, if I may be allowed to express an opinion on the subject, I would say that a careful examination of the district, would probably yield many other minerals than those enumerated, should this paper induce the Government to depute a competent person for the purpose, I shall deem my labour amply repaid. Catalogue of minerals to accompany a memorandum on the geological features and mineral resources of the Singhbhoom Division South West Frontier Agency.

A } Collections of specimens from Dhoba Pahar, Kalkapore,
 B } Badea, and Kamarara in Dholbhoom illustrative of the geology
 K } in the neighbourhood of the copper diggings.
 M }

C. 1. Sand formed by the decomposition of trap. It is from the high road between Berkela and Porahat. The sand is attracted by the magnet, and is forwarded for examination as to whether it does or does not, contain any other useful mineral.

2. Sand (chiefly iron) from Roro and Eleegara rivers, it is supposed to be exhausted of gold by the usual process of washing, and is forwarded with a view to examination for other minerals; also it is thought that a considerable amount of gold remains after washing which may be extracted by amalgamation.

3. Gold and the residuary sand from which it was obtained from the Eleegara river.

4. Sand from Roro river supposed to be exhausted of gold: Its gold in a separate packet.

4. A. Ditto supposed to contain gold (3 packets.)

5. Sand from the feeders of the Sunjye river at Porahat supposed to be exhausted of gold. The gold in a separate packet.

6. Gold and the residuary sand, from which it was obtained on the surface at Badea in Dholbhoom near the ancient copper diggings.

7. Sand and gravel from the same spot forwarded with object already mentioned.

8. Garnet schist from the bed of the Suburn Rekha at Jamsore in Dholbhoom.

9. Garnets of the above separate. These are used by the iron-smiths of the country instead of emery, forwarded for trial. The powder should be washed to separate the lighter particles before it is used.

10. Calderite (?) found near the Jail at Chyebassa. This stone is not in use as corundum or emery, but the Commissary of Ordnance, Fort William, reports more favourably of it, than that from Jugurnauthpore, which is so used, forwarded for trial.

11. Crystals of schorl from Kujoorda in Khursawa, these are used by the native smiths as emery.

12. Stone from Jugurnauthpore used as corundum. It appears to be allied to No. 10. Commissary of Ordnance reports it as rather too soft for metal cutting wheels.

13. Coarse garnets from Erkee in Tamar. These are generally used as emery by the ironsmiths of Chota Nagpore. Forwarded for trial.

14. Iron ore from Silda (zillah Midnapore.) This is highly crystalline, and is feebly attracted by the magnet, iron is very extensively smelted from it, and bears a high character.

15. Iron ore from Khursawa district.

A. from Mouza Narain Bera.

B. from „ Bitaboaroo.

C. from „ Kundudee.

These produce a much esteemed iron. The ore closely resembles No. 14, and is more strongly attracted by the magnet.

16. A. B. C. Iron from the above ores.

17. Potstone dish from Tickree in Dholbhoom. This is the best kind produced, and valued on account of its resisting fire.

19. A. Potstone dish from Kory Kela in Parahat. This is an inferior kind, and will not stand fire. It abounds in iron Pyrites.

B. Dishes of Potstone from Doobrajapore in Seraikela, will not stand fire. The stone resembles French chalk, and probably specimens might be found, identical with that stone.

20. Trap or serpentine from a dike in a hill of Gneiss at Rycoms in the Colehan, it is very hard and might be found useful for some purposes.

21. Jaspers from the Braminee river, where the Bombay road crosses it, applicable to ornamental purposes.

22. Ditto from the Byturnee river at Jynt in Colehan.

23. Ditto from Dhoba Pahar in Dholbhoom.

24. Ditto from the Roro river in Chyebassa.

25. Copper ore from the diggings at Landoo under Dhoba hill in Dholbhoom.

26. Ditto from Jamjora in Seraikela.

27. Red ochre from Sarunda, used to colour cloth, but not as a permanent dye.

28. Coloured earth from Jamda in Colehan supposed to contain Manganese.

29. Stones from Aukoora Bhanga in Sarunda at the spot where gold is found on the surface.

30. Stones from an eminence at Assuntulled in Khursawa, where gold is found at surface.

31. Silicious sandstone from Chyebassa, much used by the sepoy of the Ramgurh Battalion for cleaning their arms.

32. Iron ore from coal formation in Sumbulpore.

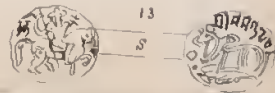
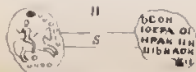
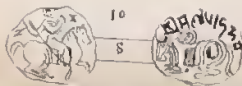
33. Magnesian earth from Assuntulled in Khursawa.

34. Stone from an old digging at Chyebassa.*

35. French chalk from Lowada.

36. Iron ore from Badea, and Kunya Looka in Dholbhoom.

* It is not known, for what these diggings were made.



*On the Ballads and Legends of the Punjab. Rifacimento of the
Legend of Russaloo. By Major J. ABBOTT.*

On Sealkote's embattled steep (1) his daily woodcraft done (2)
Russaloo lay in slumber deep, Sahl Byne's redoubted son.
A vision rose at dead of night, his guardian saint* appear'd,
His robe a web of dazzling light and silvery white his beard:
His brow was wreath'd with (3) Nurgist flowers; his staff extend-
ed far

Where Oodinugri's‡ distant towers bask 'neath§ Canopus' star.
High rose from cot and palace fair, from tower and stately fane
The groans of thousands, weeping there, friends, lovers, children slain.
Seem'd it, as all the woes and tears, that ancient site which dower
From ages of unmemoried years, reviv'd in that drear hour;
And listing deep, Russaloo felt his generous nature glow,
And 'neath the starry heavens he knelt, and breath'd his fervid vow.
"So help me all ye Heavenly Powers! sun, moon refuse your light,
"And golden-throned stars withdraw into the void of night;
"Ye winds, who waft on dewy wing spring's freshness, mountain born,
"The rosebud's fragrance careless fling, pure health from waving corn,
"Die 'mid the sweets your wing that cloy, nor fan my feverish brow!
"Ye crystal springs whose thrill of joy, earth's azure arteries know,
"In steamy jets heaven's sapphire blot, or through earth's clefts
subside
"And in hell's dismal caverns rot, a foul polluted tide!
"And thou Pavahk, dread fire king, hear, recall each genial flame,
"That with thin air and water clear, upbuilds this mortal frame,
"If pleasant food my palate cheer, or slumber seal mine eye,
"Or minstrel harp shall soothe mine ear, with deeds of days gone by,
"Until the robber bite the dust, and heav'n's benignant ear
"Of mirth and joy, its sacred trust, not vainly list to hear."

* Devarchies. Deified saints of Hindoo Mythology.

† Nurgis. The Narcissus, common in the North of the Punjab.

‡ Oodinugri is the ancient name of Lahore according to tradition.

§ Canopus in the Punjab is seen but a few degrees above the Southern horizon, and from Sealkote appears to hang over Lahore.

The vision fled, Russaloo woke, in arms of proof array'd
 His hero limbs, and pois'd and shook his trenchant battle blade,
 And jealous scann'd its surface blue, lest haply stain impair
 Or dim the pure etherial hue, baptiz'd in* fire and air.
 The flexile mail around him clings, blue steel and ruddy gold ;
 O'er this the surcoat rich he flings, whose every (4) vital fold
 Is fenc'd with damask plate of proof, which prison'd Genii frame
 Beneath the mountain's cavern'd roof in red Volcano flame.
 His father's shield, his father's sword, the bow of steel, which none
 From (5) Bruhm, the empire's first dread Lord, to this his hero son
 Could bend, but which Russaloo's might like twig of osier plied,
 Whilst every dart (6) that err'd in flight, rebounded to his side.
 Such were his arms ; no flaring gleams their hue celestial mar,
 But from his eye heav'n's vengeance streams, a bright destroying star :
 And such the life, grace, power and joy his every gesture shows,
 The air seems made his step to buoy and glistening round him flows.

No rest his gallant courser knew, till o'er those verdant bowers,
 Where Ravi leads her current blue, rose Oodinugri's towers ;
 A battlemented mass immense, ramp, bastion, gateway high,
 Whose slender obelisks streak intense the sapphire-vaulted sky :
 A lean dog howl'd before the gate, no sign of life, beside,
 Rose from that city desolate, where roar'd of late life's tide ;
 No warder watch'd the massive port, no turban'd troop stream'd
 through,
 But o'er the foot-worn, terrac'd court, the dank weed frequent grew :
 And as the steep ascent he clomb, his hoof sounds scar'd the rest
 Of vampire bats which make their home, where man's last home is drest.
 He pac'd the silent street.—One form, so wan, so pale, it might
 Be the sad ghost who rides the storm, flitted before his sight.
 As broke the long-unwonted clang, she vanish'd, shrieking, " Woe :"
 That thin voice like a death knell rang, it ic'd his bosom through.
 " Woe ! woe !" the faint, unearthly cry fill'd all that city lone,
 The empty walls, the hollow sky were peopled with a moan.
 High tower'd the fort with menace vain, wide-port'd halls appear'd

* The cast steel of sword blades forged in the East is generally too brittle to bear the plunge into water, and is tempered either in air or in oil.

And many a graceful, snow-white fane, its antique obelisk rear'd ;
And 'neath the lordly palace frown, crouch'd low the ragged cot,
Pomp o'er pale Squalor scowling down, their common end forgot.
And many a graceful date-palm stream'd her tresses o'er the sky,
The Peepul's fluttering masses gleam'd in tints of warmest dye :
But on the fortress crenell'd wall, no archer bands appear,
No banner's wave, no trumpet call, no gleam of slender spear ;
And from the fane no tinkling (9) bell announç'd stern Sheeva's rite,
Nor shrieks of conch his orgies swell, nor priests who hymn his might,
No bearded Synod courts the shade, the* Peepul (8) glooms alone,
Each leaf a restless sprite hath made his own peculiar throne.
At length before a portal high, his steed Russaloo stay'd ;
For here at length one plaintive cry life's latent spark betray'd.
He left his steed without the gate, a hall before him spread,
Where o'er the hearth a matron sate and drest unleaven'd bread.
Above the brightly glowing brands, her wither'd person hung
And whiles she wept and wrung her hands and whiles she wildly sung.

Song.

Ah ! well a day ! Ah ! well a day !
The sun lights up the dawn,
With gems bespangles bower and spray,
With flowers the dewy lawn.
The ray that sparkles sheen and coy,
That self-same joyous ray
Consumes the widow'd mother's joy,
My child !—Ah well a day !

2

Ah ! wherefore gleams that ray so bright ?
Why bloom the flowers around ?
But that in gulf of blacker night
Her desolate soul be drown'd ?
Yet men thee call the merry, merry sun ;
Nor falsely thus they say ;
For widow's tears are mirth to none
But thee.—Ah well a day.

* The Peepul is an aspen. The incessant flutter of its leaves is attributed to restless sprites inhabiting them. The young leaf has a rich hue of Indian red.

3

The headsman robes his brow in gloom
 Enshrouds his form in night,
 In pity of his victim's doom,
 Whom thou bemock'st with light.
 Ah ! falsely smiling, heartless god,
 On thee my curse I lay :
 Fate blot thee in thy victim's blood
 From heav'n—woe, woe's the day.

Thus weeping singing still, the while, she drest the bannocks fine ;
 On either side a mountain pile had serv'd a host to dine.

Russaloo spake : " What mean these tears, this desolation wide,
 " Yon pile (10) of bread might feast for years the* Pandoo in his pride.
 " On either side the spacious way, fort, palace, mansion stand,
 " Bazaars so high, at noon of day they shadow deep the land ;
 " But, save thyself, no living thing hath cheer'd mine aching sight,
 " What curse could such wide mischief fling, this deadly, general
 blight ?
 " Cease thy sad weeping, mother mine, be sure I'll freely shed
 " My blood to staunch those tears of thine, and guard thy reverend
 head."

" Why do I weep ? Ask rather why tears yet remain to flow,
 " That plenteous floods have fail'd to dry their deep, lone source of woe:
 " Seven noble sons around me grew, the least had grac'd a throne ;
 " Blest in their love my moments flew, their love was all mine own,
 " For none the spousal rite had shar'd. They took the spoiler's eye,
 " One only youth his greed hath spar'd :—to-morrow *he* must die.
 " Thou whom the beard and turban gay man's stern estate attest,
 " O ! Rider of the dappled grey, arm well thy warrior breast ;
 " He comes, he comes, the monster dire, who wastes us in his wrath,
 " Before him walks devouring fire and famine dogs his path :
 " And were an hundred heroes' might in thy right arm alone,

* The Pandoos in India are the remotest of the heroic races. Every grand ruin of antiquity is ascribed to them.

“Thou could’st not cross his blade in fight, nor live before his frown.
“A monstrous race, of gods and men, the mix’d and spurious (11)
 brood,
“The cavern’d mountain serves their den, man’s flesh their daily food;
“The winds, the lightnings half obey spells taught of their dread sire,
“They walk in whirlwinds heaven’s highway, yclad in clouds and fire.
“Four brothers form the monstrous rout, the least of mountain height,
“Chindia, Pehoon, and Pugrbutt, and Tera fourth in might;
“A sister young, Bëera nam’d, their monstrous banquets shares,
“For more than mortal beauty fam’d, for wiles and deadliest snares.
“The warrior finds her weeping sad, beneath the greenwood tree,
“They’ve robb’d and left a hapless maid, woe, woe alas! is me;”
“He bids her mount his gallant steed, her arms around him throw:
“That serpent clasp shall ne’er be freed, till droops thy lifeless brow:
“Away, away, like meteor fly, pale corse and laughing grace,
“A fair day’s sport: who next will try the young maid’s soft embrace?
“Daily the lot our rulers cast for victim young and fair,
“To serve the Rakuss’ foul repast, that he our city spare.
“Six times upon this widow’d head hath fall’n the fatal lot;
“Again the dire decree is sped my heart’s last joy to blot.
“No eye regards the widow lone, none hears the orphan’s plain,
“The heart of man is granite stone, and heaven looks down in vain.”

“Cease woman,” cried the prince severe, “blaspheme not heaven’s
 dread love,
“The widow’s prayer, the orphan’s tear shrine in the courts above.
“And if heaven touch man’s stony heart, it melts to tenderest mood,
“The timorous acts the hero’s part and courts the feast of blood.
“Commit thy child to heaven’s blest care, put up thy vows for me,
“For I am sworn his lot to share, to bless or die (12) with thee.”

She fell before his noble feet, with kisses bath’d and tears,
“But go not forth,” she cried, “to meet the doom my soul for-fears;
“Thou could’st not save my hapless child, would’st share the dire
 decree,
“One added woe were o’er me pil’d t’ have curst and blighted thee.”

Fytte 2nd.

How merrily dawns the jocund morn o'er the city that aye is gay,
When the warder is winding his mellow horn, and the young bird is
trilling his lay ;

And youth and age and manhood stern and beauty matur'd in grace,
And childhood's fetterless footsteps turn to the silver wave's
embrace.

But not o'er Oodinugri's towers, woke life with waking day :
No young bird charm'd those smiling bowers, nor young maid
carolled gay.

No warder dar'd his cornet wind, no priest his conch to fill,
The portal stood fast barr'd and blind, glid past th' untasted rill ;
The screech owl reign'd without a peer, save when the raven's croak,
Or wolf's long wail, so sad and drear, that dismal jargon broke.

Russaloo back'd his gallant steed, the youth a palfrey low,
And on they priek'd along the mead to seek their giant foe.
But not until, with anguish wild, the aged dame had prest,
To her sad heart, her lov'd, lost child and oft and o'er carest.
At noon the Neel* Raos (13) silver wave laps'd past them free and fair,
Russaloo plung'd his limbs to lave and told his warrior prayer.
There rose a mist from out the wood, a whirlwind wrapt it round,
Till in 'mid heaven the column stood, and shape and substance found.
Fork'd lightnings flash'd around the brow, deep thunders pealed their
roar,

And in Russaloo's heart 'gan grow a chill ne'er felt before.
Majestic stalk'd that column tall the yet disparting ground,
The clouds their heavy folds let fall in massive drapery round :
But what those folds conceal'd from view, thought shudder'd e'en to
guess,

As broke some startling glimpses through of loathly hideousness.

And now upon the streamlet's brim, high towering in 'mid sky,
Pauses the column, gaunt and grim, whence keen, blue lightnings fly :

* I would willingly have spared the reader and myself this combat, but that it forms so essential a part of the tradition.

A voice which caus'd the life blood freeze shook all th' affrighted
strand,
And from that shroud, the youth to seize, came forth a giant hand,
Aghast, his eyeballs glaz'd and set, his palate scorch'd and dry,
His joints unstrung, denying yet the power to shrink or fly :
The hapless victim sate, one yell, despair's own freezing tone,
Fore'd his parch'd throat, then strangled fell, a faint and piteous
moan.

Russaloo mark'd with other eye, to heaven he inly pray'd,
Then whilst his steed rear'd wild and high, unsheathed his battle-blade.
Down flash'd the steel, a clear blue flame, such heaven's dread
armoury swell,
Sheer thro' the wrist gigantic came ;—the huge hand weltering fell,
Spouted the hot, red torrent forth, the writhing monster's roar,
Of pain and shame and coward wrath, the free wave backward bore ;
He yells, he flees, stride urging stride, the cloudy mantle roll'd,
Round his gaunt form is scatter'd wide in many a giant fold ;
And now some monstrous limb breaks thro', now towers his shaggy
head,
Like forest-tangled mountain brow, whose eye the watch fire red.
His knees the waving forest rend, huge trees uprooted lie,
Like grassy tufts, that crash or bend, when the merry hounds give
cry :
And such the tumult, roar and din, as when Pavahk's* dread ire,
The wild Maroots† incense to win man's realm with girdling fire.

His mighty brothers mark'd his flight, half wondering, half in dread :
“ Up, up,” he cried, “ while haply flight avails to screen your head,
“ The hour foretold in wizard lay, that hour of dole and doom,
“ The rider of the dappled grey, the man of fate is come.”
Thus Tera, as he fled amain nor respite knew nor stay
Till leagues six score and rivers twain, twixt him and vengeance lay.
Splash thro' Chenab's swol'n stream he strode, his knee the surges
found,

* God of fire of Hindoo Mythology.

† Maroots the winds.

From Mungla's* (14) eliff Vidustá's† flood clear'd at one giant bound:
 Dhángulli's‡ (15) vast ravine and rock his footsteps' thunder bore,
 And eehoes wild reverb and moek the crash in one long roar.
 Thither for refuge had he fled, but eeach dire eecho there
 Renews the giant's frantie dread, inflames his wild despair.
 O'er Potowarr's§ ravine-woru waste, by Maunkyala grey
 The monster bounds in frantic haste, Earth crouches in dismay.
 Swift thro' Margulla's|| (16) strait he shot. Hurróh purld bright
 and clear
 And rose, heav'n's purpled sheen to blot, thy splinter'd ridge (17)
 Gundgurh,
 Long-back'd, dark-hued, high-erested, lone, it seems to mortal sean
 By spell of age transform'd to stone, some huge Leviathan.
 And Tera joy'd as he beheld, the stronghold of his raece,
 Whose crags inviolate, yet may yield, a safe abiding plaece.
 He nears the base, ten active bounds,¶ Pir-t'han receives his tread
 Eeach wizard glen, each eave resounds and quails the mountain head.
 From crest to base was felt the shoek, blue Aba Sinde the roar,
 From eeach time wrinkled eave and rock in thunders thriee told o'er ;
 And mortals trembled far and near, for well that sound was known,
 The monstrous Rakuss, name of fear, scaling his blood drench'd
 throne.

Meanwhile doubt shook eeach giant's mind. The son of king
 Sahlbyne,
 They knew by fate's stern will design'd to close their mighty line.
 And they had turu'd their baeks in flight, but that Beera's voicee

* Mungla, Mars. A celebrated castle upon a cliff on the eastern brink of the Jelum, where it emerges from the mountain.

† Vidusta Ὀδασπης, at present called the Jelum.

‡ Dhahngulli, the deserted site of the palace and capital of a branch of the royal family of Gukkur.

§ Potowarr is the table-land between the Indus and Jelum, bounded north by the roots of the Huzara, Khaunpoor and Sutti mountains and south by the scarp of the salt range. This is the ancient limit.

|| Margulla, the pass of that name from Potowarr into Qatur.

¶ The highest crest of Gundgurh, about 4,500 feet above the sea, is of limestone.

Arose in all its silvery might, to shame their dastard choice.
“What, not *one* blow? And will ye flee, ye god-descended crew,
“Mindless of name and fame and me, who this vile recreance view?
“The very squirrel guards her nest, the lapwing takes not flight,
“Until at least her foeman’s crest, salute the trembler’s sight;
“But ye, of bulk so huge, of soul less than might serve to fill
“A squirrel’s frame, can flight control fate’s dark inviolate will?
“To fate pertain life, death; but we ourselves suffice alone
“To live from self-reproval free, and die in fair renown.”

The woman’s greater soul prevail’d, Pehoon and Chindia strode
Each in his cloudy mantle veil’d. Earth shudder’d as they trod.
Pehoon upheav’d a trident vast, that wont on each huge prong
An ox entire to rivet fast, ’mid mirth and jovial song.
Its crest high pois’d a tall Chenarr,* the forest pride and stay,
Chindia the stem uprooted tore and rent the limbs away.
A mighty rod whose lightest thwack tho’ playfully it fell,
Had crush’d primæval Mammoth’s back or shiver’d Kurma’s† shell.
But Pugrputt drew forth his sling; an elephant’s hide entire
The thong, two cables serv’d for string, a rock the missile dire,
So vast, that ship of mightiest beam, of all which swell thy state
Dread Ganges, heav’n-descended Queen, had sunk beneath the weight.
Such pebbles in his scrip he bore, the burliest son of might,
But recreant to the immost core, his thoughts were bent on flight.
And still he loiter’d, plucking now some taller Simbhul’s‡ head,
Or whistling shrill as tempests blow round Bhaingra’s§ peak of dread.

Soon as Russaloo met their eye, mirth stirr’d the giant brood,
Was this the foe they needs must fly, athirst to quaff their blood?
Their laughter shook th’ affrighted earth, like thunder-peals it rang,
Old Pir Punjaul|| enjoy’d their mirth and echoed back the clang

* The Chenarr or Oriental plane, the noblest of forest trees. It is not indigenous to the Punjab, although it will grow there readily from slips.

† Kurma, the fabulous tortoise, who supports the elephant Ihrawut, who supports the earth.

‡ Simbhul of the Punjab, Saymul of India, the Indian cotton tree, the loftiest tree indigenous to the country bearing a large red flower.

§ Mount Bhaingra an isolated summit in Huzura about 8000 feet high.

|| Mount Pir Punjaul the elevated range walling in Cashmere southward.

Full three-score leagues. With other eye Beera mark'd the foe,
 "Who dares," cried she, "our wroth defy, thy name and lineage
 show."

Replied the prince "Great Sálábyne, my sire, afar renown'd,
 "High Sialkote's dominion mine, Russaloo nam'd and crown'd."
 "Hoh! brother," Chindia laughing cried, "our fate before us stands
 "Shall we to glut his maw abide or flit to foreign lands."
 His trident pois'd Pehoon and laugh'd, three roods advanc'd his
 stride,
 But good Russaloo's fatal shaft curb'd his presumptuous pride,
 Where arm and cubit jointed grow, the broad shaft passage found,
 Keen as the levin's fiery blow, it dealt a ghastly wound.
 The ponderous trident plung'd to earth and where its fangs deep
 gore
 Old Preetha Mata's* breast gush forth streams welling evermore.

Enraged to view his brother's plight huge Chindia dealt a blow,
 Had ground to dust the ranks of might of Urjoon's countless foe.
 Like fifty tempests hissing down the monstrous club held sway,
 His gallant charger's speed alone Russaloo's fate might stay;
 Levell'd the crackling forest fell, as when on harvest morn,
 While shouts the reapers triumph tell, falls the ripe golden corn.
 Russaloo might not bide that blow, yet as he scour'd the plain,
 Drew with full force his strong steel bow: the shaft sped not in vain;
 Crash thro' eye, scull and brain the steel held its dire way,—and
 thrown
 Like mountain in the earthquake reel, the giant corse rush'd down.
 With such a shock, (18) each river flood, of five that mightiest roll'd
 Their waves surcharg'd, arrested stood, each o'er her† sands of gold;
 And Oodinugri's castled towers fell crumbling o'er the plain,
 And trembling nations sought the powers of hell and fate in vain.

Then Pugnutt in wild dismay slung, ere he turn'd in flight,
 A ponderous rock, the landmark grey, where rival states unite;

* Preeth, the earth, Mata, mother.

† The sands of all the Punjab rivers abound in gold dust. According to Hindoo Mythology all rivers, even Sindh Rania, are female deities.

Four thousand years the shepherd's throne whence he afar might
view

His fleecy charge : the granite stone in a storm of music flew.
Ploughing the earth four fathoms down and hurling splinters far,
Huge trunks of trees and rocks upthrown to dim day's golden star.
No courser's speed had then avail'd, but that the monster's sight,
Dazzled by palsyng terror fail'd, the missile err'd in flight :
Clearing a province at a bound, th' enormous mass bowl'd on,
Till in blue Sootlej depths profound firm fixt an islet lone.

Now fled the Slinger dire apace, but first up-caught and bore
Beera's form of matchless grace, pale as the lily flower.
Pehoon in Tera's footsteps fled, till heav'd Gundgurh in sight,
But Aba* (19) Sinde inviting spread, his sheeted silver bright :
He wades, imbibes the ice-cold flood, then turns an anxious eye,
Where dread (20) Aornos' forests nod far mid the azure sky :
Thither he fain had fled but pain unnerv'd his giant pride ;
He sank to rise no more again, from that cold gliding tide.
There, when his latest breath was past, his wounded brother came
And pil'd the rocks and forests vast to hide his giant frame ;
And still the (21) tomb his name retains, an islet rock that now
Mid Aba Sinde's full, azure veins uprears its castled brow.

Fleet on the Slinger's traces came Russaloo's noble horse
That steed of purest strain and fame, unmated in the course.
Thrice strain'd the prince his bow of might and thrice his keen alarm
Lest he the beauteous maiden smite unnerv'd his manly arm ;
A fourth essay, the winged steel on mission dire hath flown
Hath deeply gor'd the flying heel, and brought the monster down.
And stern Russaloo's blade is bare, comprest his lips, his brow
Lowers o'er the eye's dilating glare, like storm-cloud charg'd with
woe ;

But Pugrputt rehears'd (22) a spell, and o'er his frame entire
A magic influence instant fell ; down flash'd the blade of fire,

* Aba Sinde. Father Sinde, the name given by the veneration of his borderers to the noble river Indus. The Hindoos however style him Sinde Rania, Queen Sinde.

But not to cleave its gory path : the massive granite rock
 Receives and foils the hero's wrath, yet shivers in the shock.
 Amaz'd he glares on all around, mistrusts his reason's ray ;
 Where cumbering late the groaning ground, the monster weltering lay.
 A huge grey ridge of rock alone juts from the sandy plain,
 And mimics rude in granite stone some mighty giant slain ;
 Of monster, maid, sole visible trace ; around the rock he rides,
 Assails it with his steely mace. The rock his wrath derides,
 Till with the fruitless toil distraught and warn'd by fading light,
 A Dhurmsála* lone he sought and couch'd him for the night.

Fytte 3rd.

Meanwhile, within a cavern'd hall Beera lay reclin'd,
 Pondering her glory's darken'd fall with tempest shaken mind :
 Now o'er her mighty brother's fate the tears unbidden rise,
 Now with revenge and deadly hate blend love's insidious sighs,
 Despite her rage and shame and woe, her woman's heart is won,
 As tigress mates with but the foe, whose might excels her own :
 The dismal gloom around her spread were utter, Ethiop night,
 But that her flashing eyes still shed an ever-changeeful light ;
 And that above her hung suspent (23) carbuncle large and rare,
 Which through the gloom its radiance sent, like Sirius' burning star.
 Rich sculptur'd gold and ivory rare her beauteous form uphold,
 Rose-tinted silks make doubly fair, those limbs of faultless mould.
 But save her loveliness alone and proud, fierce innocence,
 No robe the maiden e'er had known, nor felt shame's withering sense.
 Above the cavern's roof reclin'd her mighty brother lay,
 Sense, life in solid rock confin'd, a mass of granite grey.

The maiden's beauteous cheek was pale, her brow was flush'd,
 her eye
 Suffus'd with tears which ere they fall, the flashing lightnings dry.

* Dhurmsala, Hall of charity. The Hospitium of the Hindoo.

"Immortal author of our line Kuveera* (24) dread," she cried,
"For what unblest, perverse design thine offspring's might and pride ;
"Lords of the earth to day we mov'd, but frames of giant might
"All uninform'd with soul have prov'd ; earth, heaven hath seen our
flight. [sire,
"What owe we thee, dread father, say, that thou should'st be our
"Yon lumbering forms, death's easy prey, or souls of glowworm fire.
"Are gods than mortal men less wight, that from the union rise,
"Souls shrunk and dwindled in their might, whilst form dilates
in size ;
"Recall thy bitter gift of life, since thou hast not to give
"The fame which gilds our being's strife and makes it life to live."
Thus in the cavern'd gloom she pour'd her wild reproachful cry,
And from the rocks in deep accord, uprose a mournful sigh.

Dreams broke Russaloo's toil-worn rest, mid strife and vision'd
woes,
To calm his tempest-shaken breast his guardian (25) saint arose :
Benignly o'er the prince he smil'd, then as he vanish'd slow
In Ravi's current, rippling wild, seem'd beck'ning him below.
The Raja burst the bonds of sleep and donn'd his azure arms,
Whilst stars of heaven sweet dew showers weep, bright in neglected
charms.
Beneath him far meandering spread, the Ravi's twilight flood,
Fring'd with dense groves of gloom and dread, a spirit haunted wood.
Calm as young maiden's sinless rest, ere love hath taught a sigh
Or care hath dimm'd her spotless breast, the starlit waters lie ;
For ever rippling clear and bright, the blissful current flows,
No rock to break, no cloud t' affright her musical repose.
Blest in the water's sweet embrace a fairy island smil'd,
Three trees of noblest growth and grace, wav'd o'er the flowery wild ;
And fondly droop their foliage down, the gliding wave to bless,
Which, coy as maiden, dances on and shuns the soft caress.
And through the foliage gleaming fair a snowy fane aspires,
Enshrin'd as Wood-nymph, chaste and rare, sweet mark of pure
desires.

. * Kuveera, one of the inferior deities. God of wealth.

She bathes in æther soft above, in crystal clear below ;
The stream hath dread to mar or move her shadow in its flow.
The foliage, mass'd her form to wreath amid the starlit sky,
Droops round her in the flood beneath, where broad its masses lie.
No lifeless pile of stone appear'd to greet Russaloo's eye,
But rather spirit shape rever'd, sweet, solemn company.
And as the hero deeply gaz'd, a meteor large and bright
From the high zenith glancing blaz'd, cleaving the void of night
With flood of crimson, green and gold and violet's softer ray :
The glorious Orb majestic roll'd down heaven's star-spangled way ;
Linger'd above the fairy Fane as loth to quit her sight
Then waveward led its glittering train and set in utter night.

Russaloo's heart throb'd full and high, he bless'd the gracious sign,
He hail'd that herald of the sky, fresh from the hand divine.
Adown the steepy cliff he sprang, attain'd the rolling tide,
Flash'd the bright wave ere yet the clang of arms and armour died.
His vigorous arm subdued the flood, which fled the strife, dismay'd,
And soon on that lone isle he stood, beneath the starlit shade ;
A pillar'd porch (26) of marble stone gave access to the shrine,
Whose massive obelisk purely shone, to lure to rites divine.
Within the cell hung wreathen flowers, a youthful mother's vow,
Had strung t' appease the gloomy powers, who govern death and woe,
He search'd the sacred area round, if outlet there might be ;
His foot an iron ring hath found, he grasps the massive key,
With force unknown to mortal wight upheaves the ponderous stone,
Whose weight had baffled human might for centuries unknown.
A flight of steps led darkling down, into the cold earth's breast,
A clammy wind with fitful moan, Russaloo's sense opprest.
Yet without pause the dive is made, groping his rayless way,
Sole guide his bare, protruded blade, heaven's grace his only stay.
And thus for miles, that entrail dark, so narrow, dank and lone
He track'd, uncheer'd by faintest spark of light to guide him on.

At length, when hope wan'd faint and low a distant gleam he spied,
Such ray the charnel oft will show, where rot man's power and pride.
And, as he (27) near'd the mystic light, two globes of dull, red fire,
Set in the rayless void of night, surmises strange inspire :

And high above the cavern grew and wider spread around,
And freer breath the hero drew, the night gloom'd less profound ;
And those red orbs intenser glow'd, and 'neath them gushing aye
A vaporous flame incessant flow'd, of pale, blue, spectral dye.
Some monstrous living thing seem'd there to hold his leaguer dire,
Known by his eye-ball's baleful glare and breath of sulphurous fire.
A sound, faint heard from far, from near, of many a scaly fold,
Wounding with muffled clash the ear, as each o'er other roll'd ;
Dimly the serpent shape defin'd to fancy's startled eye :—
How 'mid that darkness dense and blind shall he its might defy.

Full at those glaring orbs he smote :—the temper'd scales gave way ;
But the slope crest and flexile throat yield to the warblade's sway.
And rous'd to strife the monster hurls his wildering coils around
Russaloo's frame, in ceaseless whirls of death's cold potency bound.

'Twas then a star which long had shed its ray, to mock the sight,
Blaz'd forth in full effulgence red, flooding the cave with light.
Blest, heaven-sent ray," the hero cried, as at each mighty blow
Which hew'd the monster's scaly side, the blood red torrents flow ;
Yet spite his more than mortal toil, the deadly folds creep round,
Till in their clay cold massive coil, his struggling frame is bound,
And the dire fangs his throat invade :—he plung'd his dagger'd hand
Down that dark gulf, until his blade the jaw's black chasm spann'd.
Those hellish jaws clos'd crashing down, and thro' the palate driven,
The keen, thrice temper'd blade held on, until life's shrine was riven.
Then droop'd the languid head, then fell ;—but the death-struggle 'gan
And with an ocean's sway and swell thro' those vast volumes ran ;
Tugging the strangling coils amain, with vast, spasmodic throes,
And mightier seem'd the monster slain, than when his proud crest
rose.

Panting within the death cold twine, one superhuman stroke
Sever'd at length the monster's spine, the hero's bondage broke.
Light bounding o'er the humbled crest, once more Russaloo stands
And lifts to heaven the heart opprest, to heaven the clasped hands.
Then onward thro' the cavern strode tow'r'd that mysterious light,
To whose thrice welcome ray was ow'd his triumph in the fight.

In golden chain suspended hung from the black vault on high
 A glorious gem, which pencils flung of each etherial dye ;
 But crimson as the maiden's lip, when love with venom'd dart
 Hath stung the rose he feign'd to sip, and pierc'd the trusting heart,
 It's innate hue ; and all around partook the roseate dye ;
 And still where warmest hues abound, bright golden flashes fly :
 And basking in that wondrous ray, hemm'd in with night profound,
 A beauteous maid extended lay in slumber's trammels bound.
 One arm of rounded ivory o'er the downy cushion hung,
 From whose bright coil its silken store the sweet head graceful flung.
 In many a rich, unfetter'd fold, as from an urn most rare,
 Gush'd the bright stream of wavy gold, the rich, dark, auburn hair,
 Strewing the carpet's velvet fine :—the roseate pillow well
 Reliev'd her features' faultless line, her soft cheek's matchless swell,
 The slender throat's transparent sheen, the polish'd shoulder bright,
 And one sweet orb that half was seen, half shunn'd the gazer's sight.
 Pale was the cheek as lily flower, when roses bloom around ;
 Tranc'd the blue eye's soul kindling power, in slumbers hush profound.
 Yet scarce the lids soft-feathery snow, their radiance might confine,
 Which streak'd their lustre teeming glow in many a violet line.
 And where the long, black lashes lay, like children of the night,
 Hush'd on the spotless breast of day, o'erflow'd th' excess of light.

High is the privilege thus to bend o'er beauty's hallow'd rest,
 Scaring afar each lawless fiend, might desecrate the breast.
 And aw'd by influence new and sweet, he breathless hung the while,
 And fain had still'd the heart's wild beat, the vagrant Fancy's wile.
 As o'er some star-watch'd mountain lake, the jealous breeze will fly,
 An instant, heav'n's blest image break, then mocking, whirr on high.
 So, whiles o'er that translucent brow, slight, ruffling shadows veer,
 Now clench'd the fairy hand of snow, now starts th' unconscious
 tear.

Again as in an April sky, the transient shade is flown,
 Sweet peace hath calm'd the curtain'd eye and made the brow her
 throne.

The lips their rubies half dispart, half show the pearls enshrin'd,
 The vermeil tides which warm her heart, her cheek's cold lilies find.

Morn never flush'd Cashmera's lake, with richer, rosier dye,
When myriad flowers from sleep awake with her in bloom to vie.
The cheek's bright calm a dimple breaks, a whirlpool, sweet and lone,
Where giddy love his helm forsakes, resistless hurried down.
The lips half smiling, trembling play, bliss thrills Russaloo's frame,
When in a murmur, sweet as they, he hears her breathe his name.
Then, with a sudden, deep drawn sigh awoke the slumbering maid,
And languid op'd the curtain'd eye, and keen amaze betray'd,
For statue-like before her stood the form her dreams portray'd,
His azure armor stain'd with blood, his surcoat rent and fray'd ;
The warblade propp'd his better hand, the turban's sable hue
O'er features stern and forehead grand, a shadowy potency threw,
From which the high arch'd falcon eye, had gaz'd death's terrors down,
Its soul of radiance, calm and high, concentr'd on her own.
The slayer of her mighty race, the man of fate and fear,
In all his godlike strength and grace ; her proud heart's Lord stood
near. [keen,

Then first, the maiden terror knew ;—then first, shame's anguish
And rising half, around her drew the envious silken screen.
And on her mighty brother call'd, then conscious of his plight
Rehears'd the spell, whose sound appall'd each shadowy friend of
night.

Trembled the stable earth beneath, the massive walls around,
The surly thunders spent their breath to thrill that dreadful sound ;
The granite roof took form and life, and 'mid the starry choir
Huge tower'd the giant, arm'd for strife, red roll'd his eye of fire ;
But bent Russaloo's mighty bow (28) and ere th' upheav'd rock
Can fall, transpierc'd that cliff-like brow : he stagger'd to the shock.
He nodded, bow'd, with hideous roar, plung'd from the starry height :
His fall, the prince imperils more, than all his living might ;
But anxious for the maid alone o'er her Russaloo bends,
To buy her safety with his own, his sheltering might extends.
No mother o'er her first-born child e'er hung with tenderer care,
When rav'd the tempest, bleak and wild, 'mid forked fire-bolts glare.

As rushing from the starry sky th' enormous ruin fell,
Earth's frame beneath, heaven's vault on high dread chaos claim'd to
quell,

And tho' one giant hand alone imping'd the hero's crest,
He sank, by that dire blow struck down, it seem'd to final rest.
Pale o'er her virgin breast of snow, as lull'd by love's warm kiss,
Droop'd the cold cheek, the marble brow, unconscious of their bliss.
That arm of might late rais'd to guard the cowering form beneath
Enclasps her, yet, with sleepless ward, caressing e'en in death.
Stunn'd by the crash, the maiden lay in brief oblivion drown'd,
But when with reason's rallying ray, she gaz'd bewilder'd round,
And mark'd that glorious form laid low, his life the price of hers,
She bow'd her o'er the pale, cold brow and bath'd it in her tears,
And with her fairy hand carest that forehead stern and high,
Where clusters clung, like Bacchus best, of hyacinthine dye,
And self-accusing, beat her breast, her golden tresses tore,
Her malison of woe exprest upon her natal hour.

Thrill'd by that soft caress to life, Russaloo's pausing heart
Throbbing renew'd his being's strife : he rose with sudden start,
And gaz'd with unbelieving eye on vision all too fair,
And marvell'd at the frantic cry, the maiden's wild despair.
Then, changeful as the heaven of spring, which, while the tear showers
start

Will from its bow of promise fling, dire fire-bolts of the heart ;
So, when the hero rose in life, whose death her soul subdued,
Shame, self-reproach and wrath held strife, loud shriek'd her brother's blood.

And with a majesty, that well beseem'd her matchless grace,
And with a fierceness naught could quell, the dower of her wild race.
Like the bereaved tigress young, she glar'd upon her foe,
Her flashing eyes their lightnings flung surcharged with fate and
woc ;

More beautiful, more bright she seem'd, thus rous'd to strife and
war

As, launch'd from sphere, where calm it beam'd, floods heaven the
shooting star.

A dagger in her grasp she prest, with more than woman's might
She smote the hero's mail-arm'd breast : forth gush'd the lifestream
bright.

Then on herself the thirsty blade with maniac fury bent,
But his strong hand the weapon stay'd and marr'd her fell intent,
Each fairy wrist with gentlest might resistless made his own,
And calm'd her Passion's frantic might with reason's godlike tone,
Till with emotion new opprest, o'eraw'd by reason's sway,
She sank upon his bleeding breast and sobb'd her woes away.

Fytte 4th.

On Sialkote's age-structur'd height and blood (29) cemented
towers

A thousand pennons flutter bright as Indra's bow of showers.
And the wide plains, afar and near, their teeming myriads yield,
And banner gay and glancing spear light up the peaceful field.
It is the young, sweet dream of spring, fair nature's jocund morn,
When flowers cut down by winter's wing in youth renew'd are born.
The happy breeze (30) from some far land her exil'd Koel bears,
The Peeluk, (31) long by winter bann'd, back to her home repairs.
Like pebble (32) bounding o'er the ice, far thro' the echoing grove,
Whose aisles resound the music thrice, that note of bliss and love,
Trills the Woodpecker's sylvan cry, while gleams his gay form, stol'd
In crimson rich and saffron dye and russett dropt with gold.
Aye and anon (33) fresh tumults stirr'd the feathery choir employ,
As back returns some banish'd bird and loud proclaims her joy.

Wak'd from his downy couch of rest in far Tibetan snow,
The sun upheaves his golden crest and life-restoring brow,
His smile responds the shadowy grove, the verdure-vested plain,
Thro' tears, once sad, his waken'd love hath made all bright again.
Softly the corn (34) its emerald waves heaves to the breath of morn,
Each islet grove and castle laves, each gnarl'd and antique thorn.
The banners wave, the banners glow, far 'mid the dewy sky,
In air-tide soft and hush'd and low, as love's own delicate sigh.
Fair nature holds high jubilee, and man once more is gay
And hails (by that strong arm set free) Russaloo's bridal-day.

And where is she for whose bright smile, lit up the festal hour?
In yon high, blood-cemented pile, is deck'd her gorgeous bower.
The merry sunbeams, streaming through, light up with golden haze
The blazon'd deeds of maidens true, and men of other days:
And on the fretted roof (35) display the marbles, chaste and rare,
With ruddy gold of rich inlay, in happiest contrast there.
And o'er the floor of marble strown, rich Persian carpets glow,
And tissues bright from lands unknown, like golden fountains flow.

But not one joyous ray breaks through the sad heart's dungeon
gloom,
To scatter far the spectral crew, whose fires her soul consume.
The young, sweet dream of woman's heart before her spreads its
lure,
From his lov'd side no more to part, while time and life endure.
Elysium bright, whose gate to bar, the fiends of Night arise,
Her own proud spirit stirs the war, her brothers' blood replies.
The shades of her redoubted race o'erthrong the bridal bower,
Their scowling brows her soul deface, quell reason's happier power.
"O! Recreant," cried an inward voice, she strove in vain to drown,
"Is this Beera's blameless choice, a sister's high renown?
"Our blood from out the desert sand, for vengeance cries in vain,
"A sister clasps the ensanguin'd hand, ere dry that damning stain."
Then lower'd anew each gloomy brow, and glar'd each dreadful eye,
And apish faces mop and mow, and hellish voices cry,
Till frenzied, from her brow she tore the gemm'd and golden hair,
And dash'd upon the marble floor, her forehead pale and fair;
And suppliant sued the monster death, by many a honied name,
With his black tide and icy breath to quench life's torturous flame.

A noble form bent o'er his bride, nprais'd her in his arms,
Kiss'd the sweet brow with crimson dyed and sooth'd her wild
alarms.

At sound of that soul-quelling tone, the demons yelling fly;
The maiden stirs; with piteous moan nplifts th' affrighted eye,
And drinks with ear athirst and soul snbdued and calm'd the while
Those accents fond of high control, and suns her in his smile.
"Oh! leave me, leave me!" wild she cried, "the hosts of hell await

“To snatch from thee thy hapless bride, would ’whelm thee in her fate.

“Twixt thee and me they scowling stand, e’en while thine arms entwine

“My thrilling frame—our love is bann’d, I never can be thine.”

He sooth’d her with love’s whisper low, with reason’s lore divine,
Smooth’d each bright tress that o’er her brow far flung its golden twine,

Then led her to the terrace high, where wheel’d beneath her sight
The Jusrut’s* youthful chivalry, array’d for mimic fight.

The day wore on with pageant fair, the bridal hour drew nigh ;

A caldron vast the Mænials bear of silver sculptur’d high ;

Rich spoil of Yavan’s kingly race, a noble Font and rare,

Full many a young and laughing grace, had plung’d delighted there.

With sculptur’d forms emboss’d and drest, strange shapes of classic lore ;

There coiling hydras rear the crest, there winged lions roar.

Satyrs and fawns and Dryads troop the basement rich around,

And mermaids fair and Nereids group upon the watery bound.

Bright urns with olive oil replete, a thousand maidens bring,

In spotless robes, with naked feet, the nuptial chaunt they sing.

Into the basins vasty hold evers’d their large supplies,

Till to the jewell’d brim of gold, the sluggish tides arise.

Crackles the cedar fire beneath, up boil the unctuous waves

A gulf whose dire embrace is death, the stranded silver laves ;

And round and round the blazing bound the bride in youthful charms

And hero tried, in manhood’s pride, march with inwoven arms.

Then frenzy fir’d the maiden’s eye ; for ’mid the lurid haze

Of vapours curling wild and high in dim fantastic maze.

Ghastly and gaunt her brothers stood, as when in death they fell,

With soil deform’d and stain’d with blood from wounds that darkly well.

Each on the ghastly token laid his hand of purple dye,

And fasten’d on the frenzied maid his glaz’d and stony eye :

* The Jusrut family succeeded the Pandoos in the Punjaub.

And at the sight, within her breast the nature, love-subdued,
Rallied in fierceness unrepent and yell'd aloud for blood.
They sign her to that gulf of death ; with force to maniacs known
She shrieking strove to plunge beneath and drag the slayer down.
Foil'd by the hero's gentle might, with frenzied eye she spied
His jewell'd dagger gleaming bright—snatch'd, plung'd it in her side.

She droop'd—she sank without a sigh in those love-circling arms ;
Peace scar'd wild frenzy from her eye, sooth'd all her soul's alarms.
“ Oh this is freedom, this is peace ! This, this is life,” she cried,
“ Their taunts those dreadful shades surcease, at length I am thy
bride.
“ Thine for the brief, sweet, measur'd space, it costs life's tide to
flow,
“ Thine in this last, fond, close embrace, all, all I e'er must know :
“ Thine in fond memory's hallowing lore, thine, thine in every joy ;
“ Undimm'd by faults I deep deplore, my nature's dire alloy.
“ Nor think my step can be pursued,—beyond earth's bound doth
lie ;
“ A gulf surcharg'd with kindred blood ; there severing us for aye. ”
“ Farewell ! farewell ! I do not say, think on thy perish'd bride,
“ Her form shall bless thee still by day, in dreams shall grace thy
side.
“ Nor deem 'tis senseless air ye clasp, in those encircling arms ;
“ Her love, defying death's cold grasp, survives these fleeting charms ;
“ 'Twas all her worth, her soul's true dower, her heart's one trem-
bling plea,
“ Shade of thy nobler nature's power, thro' life 'twill follow thee.
“ Then press once more thy lips to mine—in this sweet, sacred
spell
“ Receive my parting breath to thine—thus, thus ! O bliss ! Fare-
well ! ”

Conclusion.

Years past, but not the gloom of woe from good Russaloo's breast,
Care timeless wrung his youthful brow and marr'd his spirit's rest.

Yet still, from others' bliss deriv'd a solace pure he found,
Which wrecks of youthful hope surviv'd and freshness scatter'd
round.

'Twas when time's softening wing had swept the furrow'd scars of
woe,

And tears in midnight silence wept had ceas'd at length their flow ;
That summon'd by the general wail, Russaloo sought the bound
Of Abisara's fertile vale, with mountains girdled round :
For there the Rakuss dire, who fled the hero's conquering brand,
Still haunts the rugged mountain head and wastes th' affrighted
land.

He travers'd swift the selfsame track Pehoon had trod erewhile
Till old Gundgurh tower'd steep and black in morning's golden
smile ;

The monster heard that voice of doom and dropt his shuddering prey,
And to his den's deep, cavern'd gloom fled, wing'd with wild dismay.
In vain Russaloo hail'd him back with truceful proffers wooed ;
And through the cavern's entrail black his footstep far pursued ;
To all but Terror's impulse dead, he deeper grop'd his way !
Russaloo slow retrac'd his tread, back to the light of day ;
There in the cavern's jaws of death uphung his dreadful bow,
Secure, the sight would chain beneath man's dire, but dastard foe.

And centuries since have roll'd away and threescore times renew'd
Hath man's sad race by slow decay, the bygone race pursued ;
Yet pent within that dungeon hold, the Rakuss dire remains
Where old Pirthan, his forehead bold lifts o'er the subject plains ;
And oft' to scape his doom of night will seek the entrance low :
But aw'd and terror struck at sight of good Russaloo's bow,
Back to the darkest gloom retrace his step with hideous roar,
Which rocks the mountain to its base, and quells the affrighted shore.

And good Russaloo's frame is dust and little men alone
Tread where the mighty, wise and just, 'erst built a glorious throne.
Yet stabled in a cavern old on bleak Sirbhunna's crest
Stands, barb'd for fight, his war-steed bold, impatient of his rest ;
And near the cave disjected lies, the Valve, with his strong bow

Russaloo's might would easeful price and o'er the entrance throw
 A marble rock of mass immane, with age and lichens grey
 Might foil the strength of fifty men of our degenerate day.
 And still with awe the peasant views that relic ag'd and worn,
 And o'er the hero's might will muse and sigh for his return.

Notes to the Legend of Russaloo.

(1). On Sialkot's embattled steep.

Sialkot one of the most ancient of Forts and cities of the Punjab was founded by Rajah Sala Byne or Salivahanna, father of Russaloo. The Fort, which adjoins the city to westward is a high, oblong mound, with rectangular defences of curtains and round towers, massively built of brick and mortar. Not many Baktro or Indo-Greek coins are found in the ruins. The commonest perhaps is the copper coin of Apollodotos.

Sala Byne of the Pooroowar family of Chundrabunse Rajpootres, flourished in the first century of our era. Sialkot was probably the capital of that Pôros (πωρος) Pooroo, who was surnamed the coward by Alexander's soldiers.

(2). His daily woodcraft done.

The character of Russaloo as preserved by tradition, resembles the model proposed to themselves by Knights of the chivalrous age. Self-denial formed an essential part of the system. All sensual enjoyment was forbidden. His life was spent in the chase when not occupied in war, and it is said that he daily rode from his dwelling at mount Moorut to Duntour in Huzara to hunt, a distance of eighty miles, returning at night upon his wonderful steed Bhorî Rakhî* to Moorut. A similar tradition exists in Khorasaun relating to Roostum. A sculptured rock is there shown which is said to have been his palace. And from thence to the Furrah Rood and back he is said to have galloped daily to water Rôq his steed. The interval, if I recollect right, being upwards of twenty miles.

* Bhorî Rakhî, black and long-breathed. The steed on which he assailed the Rakuss was a dappled grey.

The superhuman strength of Russaloo is ascribed to his continence. He was a Jutt Rajah, i. e. one practising self-denial and wearing like Samson unmutilated hair. The fall of poor Rani Coqla his second wife, was attributable no doubt to this unamiable self-denial of Russaloo. For tradition says that one day when her beauty melted his heart, he lost this miraculous power and observed with dismay that his arrows no longer had force to rebound back to his hand. The character of Russaloo as preserved by tradition is various, according to the taste of the bards who have handed it down. Some represent him as a pattern of all that is noble and brave in Asiatic estimation. This does not include that gallantry and delicacy toward woman, which with us is essential to the character of a gentleman.

Others describe Russaloo as a savage of miraculous power, but uncouth and destitute of all sympathies proper to the hero. The same diversity of traditions regarding Roostum exists. I have in the foregoing tale preferred the tradition which is most natural and most agreeable to the general reader.

(3). His brow was wreath'd with Nurgis flowers.

From the habit of planting the Narcissus upon tombs and shrines, it has acquired a certain sacredness of character. It is true that the Hindus have few tombs. They have shrines however, many of which have been adopted by the Muhammadans. The Narcissus is common in the Punjaub.

(4).

Whose every vital fold

Is fenc'd with Damasc plate of proof which

Prison'd Genii frame

Beneath the cavern'd mountains roof in red

Volcano's flame.

The plate armour of Asia, unlike the complete steel cases of Europe is formed of rectangular plates of steel, braced over the surcoat and covering only the vital parts. Underneath, however, a shirt of mail was generally worn. Much skill is lavished upon the plates which are of cast or damask'd steel arabesqued in gold. Kawf is the prison of the genii. There, in caverns they await the day of judgment—secured by the inviolable signet of Solomon.

(5). From Bruhm, the empire's first dread Lord.

Raja Bruhm is the first on the list of Rajas of Sialkôt. I have never elsewhere met this name applied to a mortal, it being generally used to denote the Almighty.

(6). And every shaft that err'd in flight, rebounded to his side.

See Note No. 2. Such saith tradition was the force of Russaloo's bow and arm, that if a shaft erred in flight it rebounded to his hand. A proof of this wonderful power was exhibited by him on meeting the four Rakuss. They, refusing to believe that so diminutive a being could be the great Russaloo who was to destroy them, set up their Tawas (iron plates upon which bread is baked) four in number, each massive as the round table of King Arthur. Russaloo to convince them, sent a shaft through all four plates.

(7). Till o'er those verdant bowers

Where Ravi leads her current blue rose Oodinugri's towers.

According to the Bard who gave me the best version of this tradition Oodinugr is the old name of Lahor. An old site however called Oodinugr occurs on right bank of the Hydaspes below Jelum. Not being able to visit it in person I sent thither a Moonshi, who made a rough plan of it. By his account it must have been a moderate-sized town. The coins there found, are exclusively Hindi, so that in all probability it was either ruined previous to Alexander's invasion, or founded subsequent to the extinction of the Baktro Greek Dynasty. The latter appears the more reasonable assumption, for I do not think that the Hindoos had a coinage previous to the Macedonian invasion.

The approach to Lahore from the North is singularly fine. The low plain forming the basin of the Ravi is often a lawn of turf—elsewhere it is covered with rich cultivation, from which rise groves of fine trees grouped around white obelisks, built to commemorate the decease of Sikh nobles. Such is the foreground—and beyond it rise the city defences of masonry, surmounted by the still loftier towers of the citadel and the domes and minarets of the chief musjid. All these are the works of the Kings of Delhi.

These walls and towers were of course non-existent in Russaloo's day. But there must have been older works, for Lahor is too much exposed to invasion to have been ever left unfortified. And no

doubt Oodinugr like other Hindoo cities was adorned with many a graceful obelisk.

(8). The peepul glooms alone

Each leaf some restless sprite hath made his own peculiar throne.

The peepul (*Ficus religiosa*) being an aspen, is supposed by Hindoos to be haunted by myriads of evil spirits corresponding in number to the leaves of the tree, the fluttering of which is attributed to their agency.

Therefore, though Hindoos enjoy the deep shade of the peepul by day when the power of those spirits is limited, they dislike sleeping under that tree at night.

(9). And from the fane no tinkling bell announc'd stern Shiv'h's rite.

It is difficult by any arrangement of the letters of our alphabet to give the sound of this name. Shiv'h it is well known is the god of destruction of the present Hindoo creed, i. e. he is the destroying form of the great spirit Bruhm; and by the law of nature, his worship has for many ages, almost superseded that of all other gods of the Hindoo code.

For with the choice of three attributes of the Divine Essence as objects of his adoration, the Hindoo speedily forgot the creator Brahma, and the preserver Vishnoo, to devote himself to the destroyer Shiv'h. In the oldest of Hindoo histories (which however is modern compared with those of Europe) I mean the Raja Tarangini, we find mention of innumerable temples dedicated to the god of destruction, but very few to the more beneficent attributes of the Deity, which is proof that the abuse is of several centuries' growth, and not the consequence of the Hindoos' degradation as a conquered people.

The Hindoo is summoned to the worship of Shiv'h by the sounds of the bell and of the conch.

(10). Yon pile of bread might feast for years the Pandoo in his pride.

The Pandoos in India hold the place held by the Cyclops in Sicily. Even the Indo-Greek buildings in Cashmere which date probably from the 1st century of our era, are ascribed to the Pandoos.

(11). A monstrous race. Of gods and men the mix'd and spurious brood.

Such is the Indian notion of the Rakuss, whose approach was preceded by thunder, and who was supposed to have a certain degree of power over the elements. The word giant does not express the nature of the fabulous monster, nor does the Djin of Arabic fable. For although the Rakuss could at times work a miracle by muttering a charm, his power in this respect was supposed to be limited to the number of charms he might have learnt. He was also subject to violent death. The belief in the former existence of such a monster is very general throughout the Punjab. The bones of elephants occasionally turned up in the soil on the left bank of the Jelum are universally attributed to the Rakuss. A human being formed upon such bones would have been from 24 to 30 feet high. Traditions vary as to the number of the Rakuss. The name of one is remarkable. It is pronounced Terra or Tera, or rather the sound is intermediate. The giant Terra belonged to the Roman not to the Greek mythology, and could scarcely therefore have been transferred to the Punjab. It is Tera who is supposed to be still alive in a cavern of Gundgurh.

(12). For I am sworn thy lot to share, to bless or die with thee.

The chivalrous spirit of Russaloo belongs to the old and apparently original tradition; to a time when woman held a higher place in society, than at present she holds in India, before in fact, the Muhammadan conquests had introduced their degrading estimate of the sex. As the tradition has reached later years, it has probably been alloyed by the changed spirit of the times. Russaloo is made to commit acts wholly opposed to this noble generosity. The Ballad does not make the woman, for whom Russaloo was about to offer his life, a lady of rank. She is merely a woman, and she is old and in distress; the three most sacred claims upon a generous heart. He at once adopts her in word and deed as his mother.

Natoo rooh my Booddia, hunjoo ra dul kar

Jih rub ruksi tera beté ra, my sir deh-sa char.

Weep not my old woman: there is no call for tears

Since God has placed your son beneath my protection, my head shall be for his.

(13). At noon the Neelrao's silver wave laps'd past them, free and fair.

I have not been able to identify this river, not having been able to visit the spot. It should be Westward of Lahor in the Bari Doaba.

(14). From Mungla's cliff V'dusta's flood cleared at one mighty bound.

Mungla, named after the Mars of the Hindoo, is a castle upon a cliff overhanging the Jelum (V'dusta, Udaspes) and looking down upon the scene of Alexander's triumph over Poros. The Jelum is there very narrow and deep. In the castle is shown the dice board (a slab of stone) on which Raja Sri Kupp used to throw for the heads of his guests.

(15). Dhangulli's vast ravines and rock his footsteps' thunder bore.

Dhangulli, situate on the right bank of the Jelum many miles above Mungla, is a long sandstone rock peninsulated by deep ravines, the site anciently of the palace of Sooltan Sahrung, last of the Gukkur Sooltans previous to the division of their principality. Sahrung is celebrated in tradition. His memory is dear to the people, and the reputation of his justice and of his fidelity to his sovereign, the unfortunate Hoomaioon, are still proudly recorded by them. It is said that one day a horseman drew up his steed at the door of the Sooltan's palace, and seeing there a woman said to her, Send Sahrung to me. The woman astonished at the insolence of the stranger ran in to Sahrung, expecting that he would resent it. But Sahrung after a moment's reflection said, This can be the Emperor Hoomaioon alone. He ran out joyfully to receive him, and led him with reverence into his palace. Hoomaioon was in full flight from the armies of Sher Shah, Sahrung gallantly took up his cause. He saved the Emperor, but was himself slain in sight of his own palace. His skin was flayed off, stuffed with chaff and set up on the road side as a warning to others.

After him the Gukkur principality was divided and again subdivided until, its strength sapped by these subdivisions, it was finally conquered by the Sikhs under Raja Goolab Singh and Sirdar Hurri Singh. I had the melancholy gratification of releasing twelve of

the chiefs of this unfortunate family, from the prisons of Maharaja Goolab Singh, almost an equal number having perished there.

(16). Swift through Margulla's strait he shot, Hurrôh pur'l'd bright and clear.

Margulla or the broken neck is a trifling pass in the tail of the limestone ridge of mountain, westward of Rawulpindi. It has been paved with some care by one of the Emperors, whose favourite wife was detained by the badness of the former road.

Hurrôh is a small river rising in the Dhoond country and joining the Indus below Atuk.

(17.) And rose Heaven's purpled sheen to blot thy splinter'd ridge, Gundgurh.

This is one of the most remarkable mountains in the world. It is a rock of black clay slate capped with blue limestone, about thirty miles in length, and rising to about 4,500 feet above the sea.

It is generally inaccessible on the Eastern face. But three considerable fissures run into the mountain by a gradual ascent until they have climbed about half the entire altitude. The North Eastern corner of the mountain is accessible. Being isolated by valleys and not scarped with precipices on the Western face, Gundgurh might at first view appear easy of conquest. But the fact has been proved to be far otherwise.

Its main strength is undoubtedly the valour of its inhabitants; but this is assisted by local peculiarities. The Northern portion of the mountain is a table, upon which and in the ravines, dwell about 4,000 inhabitants of the Mushwani tribe, one of the bravest races in the world. The remainder of the mountain is a long sharp ridge, of which the spurs only which descend westward toward the Indus are inhabited. The ridge itself is rugged and wholly destitute of soil and of water.

Thus the northern portion, called Srikôt is a natural fortress victualled and garrisoned, and its extent being inconsiderable, the inhabitants can see almost from their dwellings the movements of an enemy beneath, and can muster rapidly at any threatened point to meet the danger.

All the ascents to the mountain are extremely steep and rugged. The mountain is filled with a thorny jungle mixed with scattered

rocks behind which sharp-shooters find secure cover. The deep Indus without a boat is close at hand ; beyond which the inhabitants can retire upon inflated hides, if hard prest. The opposite, i. e. western border of the river, is occupied by warlike, independent tribes, closely allied to those of the mountain. These tribes readily afford asylum to fugitives, and as readily come forward themselves to aid in the defence of Gundgurh.

A soldier who considers these facts, will not marvel at the fame this mountain has acquired in the Punjaub. It is one of the few points at which Nadir Shah failed, being here signally defeated. And in six battles it maintained fame as a virgin fortress, the last being the more bloody and disastrous defeat, of Hurri Singh, the hero of the Sikhs, at Nara.

(18.) With such a crash, each river flood of five that mightiest roll'd.

Their waves surcharg'd, arrested stood, each o'er her sands of gold.

All the Punjaub rivers yield from their sands gold dust. That of the Indus is of very pale colour, containing perhaps an alloy of silver or of platinum. It is difficult to ascertain the matrix of this gold, owing to the rarity of finding its particles adhering to any of the substances, whether sandstone, quartz or gneiss, amongst the debris of which it occurs. But as some of the smaller streams which rise and terminate in sandstone debris, yield also gold dust, it seems probable that an auriferous sandstone is one at least of the matrices.

(19.) But Aba Sind inviting spread his sheeted silver bright.

Aba Sind, father Sind, the name reverently bestowed upon the Indus by the tribes occupying its banks. Amongst the Hindoos rivers are generally feminine with a few exceptions. Of these Aba Sind was not one, as the following old traditionary lines will attest :—

Peeloo churria Gundgurh, nuzr kurreh kulloh :

Age bhuggeh Sind Rania, pichch eh bhuggeh Hurroh.

Chuch Bunnarr Sumundur ki, jo bheejeh so hoh.

Peloo climbed Gundgurh and stood gazing,

Before him rolled Queen Sind, behind him flowed Hurroh.

Chuch Bunnarr like the ocean, whatever you sow there will spring up.

Here the Sind (Indus) is styled Rania the Queen. Peeloo was a poet and traveller who had roamed the world twelve years on his mother's shoulders. There are many traditionary lines attributed to him, descriptive of Hunzara and its neighbourhood, but none I believe are in MS. and few of the bards or peasants are acquainted with more than a few stanzas. They are worthy to be collected, and if not collected now, will soon be lost.

(20.) Where dread Aornos' forests nod, far 'mid the azure sky.

According to Curtius, the Indus washes the roots of Aornos. According to Strabo, it is near the springs of the Indus, i. e. the issue of the Indus from the pathless mountains. Arrian makes Alexander visit the Indus in progress to Aornos.

(21.) And still the tomb his name retains, an islet rock that now
O'er Aba Sinde's pure azure veins, lifts high its castled brow.

I have taken a liberty here with tradition and have made the rock Pehoor the tomb of the Rakuss Pehoon. The names are very similar. The rock has much the appearance of a tomb. But although Pehoon, one of the Rakuss, is said to have been slain near the spot, I have never heard the rock connected with the event. Pehoon was formerly an island. But since the cataclysm of the Indus about fourteen years ago, it is an island only during the swell of the river.

(22.) But Pugrbutt rehearsed a spell.

I am obliged here to follow the tradition.

(23.) And that above her hung suspent carbuncle rich and rare.

The reader will remember the Arabian Tales in which the carbuncle is represented as luminous in darkness. This is supposed to be not wholly fabulous, but it is stated that when excited by friction the carbuncle or oriental garnet emits light.

(24.) "Kuveera dread," she cried.

Koovera one of the lesser deities of the Hindoos, appears to answer to the Plutus of Greek Mythology, or perhaps more nearly to Vulcan as Opifex. He is the god of wealth.

(25.) His guardian saint arose.

The Devarshees are the saints of the Hindoos.

(26.) A pillar'd porch of marble stone, gave access to the shrine.

The Hindoo temple has properly neither porch nor aditus. But in Rajpootana whither Greek art spread from Ariana, the temple of

Shiv'h, an obelisk, has often a porch and sometimes also an aditus both on pillars with convex roofs built by laying successive layers of flat stones of rectangular figure, so that the sides of each successive layer shall cut the corners of that below. The porch and aditus are manifestly foreign to the original design, yet their effect is picturesque and pleasing.

(27.) And as he near'd the mystic light, two globes of dull red fire.

The tradition is silent as to the means by which Russaloo found the maiden, and this verse is supplementary.

He found her and forced her, by the ungallant threat of his drawn sword, to reveal her brother's retreat and the incantation by which he might be brought out of the rock in which he was petrified.

(28). But bent Russaloo's mighty bow.

The eastern bow is seldom slackened. In figure it resembles that with which Cupid is armed, in ancient paintings. It is rarely formed of steel; most generally of wood and horn mixed. The structure is rude and simple, and apparently unequal to the work expected of it. The bowyer takes the first stick of mulberry tree that comes to hand and cuts from it a pair of crooked slips to serve as horns to the bow and a third piece for the handle or grasp. He then cuts a couple of straight slips of buffaloe horn to form the springs. If the horn be crooked, the slips are straightened by means of fire, One of the horns or points of the bow, formed as said of mulberry wood, is then laid upon the spring of buffaloe horn, and they are bound firmly together with a thong of fresh sheep's or goat's gut soaked in glue. This binding is applied in the form of a complete case. When the lashing approaches what is to be the centre of the bow, the grasp of mulberry is applied to the other end of the spring, and bound to it with the gut in like manner as the horn was secured. The same process is repeated for the other side of the bow. After this the irregularities of surface are filled with glue, and a coloured varnish is applied over all.

Marvellous as it may appear, such bows are susceptible of great elasticity and power, and if kept dry will last many a year of wear. Such a bow costs from 1 to 3 rupees: it is very handy for horsemen because so short and light.

This bow was no doubt introduced into India from Scythia by the Moguls—it is manifest that something of the same nature was in use in ancient Greece, for Homer describes the bow of Pandarus* as being formed of the horns of the mountain goat.

Curtius describes the Indian bow as being so long and heavy, as to be necessarily rested upon the earth when being drawn, the arrow also was heavy, perhaps like the Bheel arrow.

(29). On Sialkôt's age-structur'd height and blood-cemented towers.

Tradition says that when Rajah Sala Byne was building the fort of Sialkot, the foundation of the south-east bastion gave way so repeatedly, that he had recourse to a soothsayer, who assured him that it would never stand until the blood of an only son was shed there. Sala Byne upon this took a boy, the only son of his widowed mother, and slew him upon the foundation, which since then has stood fast.

Upon this tradition, the Bards converted to *Islam* have built a tale in honour of their saints, who it is said signally avenged the murder, although it happened several hundred years before the birth of Muhammed, and about a thousand previous to the Muhammedan invasion of India.

(30). The happy breeze from some far land her exil'd koel bears.

The koel is a species of cuckoo of which the male is black, the female brown. Its cry is wild, sometimes mournful, at others mirthful.

(31). The Peeluk long by winter bann'd.

This is a beautiful bird of the size of a thrush, its plumage of the richest yellow. It has a beautiful note like the bulbul's, but of richer tone, it is a bird of passage.

(32). Like pebble bounding o'er the ice, far through the echoing grove.

* Αυτικ' ἐσύλα τοξον ευξοον ιξαλον αιγος
 Αγριου. ον ρα ποτ' αυτος υπο στερνοιο τυχησας,
 Πιτρης εκβαινοντα δεδεγμενος εν προδοκησι
 Βεβληκει προς στηθος Iliad 4, 105.

Which old Chapman translates,—

He instantly drew forth a bow most admirably made
 Of the antler of a jumping goat, bred in a steep upland
 Which, archer-like (as long before he took his hidden stand
 The evick, skipping from a rock) into the breast he smote
 And head-long felled him from his cliff.

I know of nothing else that can give an idea of the peculiar and most musical note of the crested woodpecker. Its plumage is the most beautiful found in the plains of India.

(33). Aye and anon fresh tumult stirr'd, the feathery choir employ,

As back returns some banish'd bird and loud proclaims her joy.

When camped in the beautiful groves of Rohilkund, I have often stepped out of my tent in haste to see what newly arrived bird was making the woods echo with her note, amid the applause, (so to speak) of all the feathered inhabitants. The variety of singing birds in that district is greater than in any other of India, and I never hear the name of Rohilkund, without in fancy hearing the wild calls of its birds amid the sacred stillness of its groves.

(34). Softly the corn its emerald waves heaves to the breath of morn,

Each islet grove and castle laves each gnarl'd and antique thorn.

The seas of rich cultivation in the Sialkot district are broken here and there by some dark grove or solitary tree or half ruined fort, entirely isolated by the green expanse which undulates around them to every passing breeze.

(35). And on the fretted roof display the marbles chaste and rare,
With ruddy gold of rich inlay, in happiest contrast there.

The white roofs of marble ornamented with gilding are amongst the most elegant decorations of eastern architecture. Although I have introduced them in the age of Rajah Russaloo, it is probable that they were not known in India, previous to the Muhammedan invasion.

Whilst yet the Sikh Government ruled in the Punjaub, I stayed a day and night at the castle of Sialkot in a chamber built for the service of the Muharajah Runjeet Singh. The walls were impanelled with frescoe paintings of scenes from Hindu and Persian fable, and notwithstanding many defects, were in the highest style of Hindu art, and very superior to the generality of their productions.

The Sikhs were barbarous compared to the Moguls, whose elegant designs and rich and graceful details are still the wonder of the world. I do not therefore mention this chamber as a specimen of eastern architecture, but because it suggested the passage of my text.

(36). And tissues bright from lauds unknown, like golden fountains flow.

Golden tissues are matter of history with us, but still form indispensable articles of luxury in India. They are often very beautiful, being formed of a silken web and a golden woof. For this fabric the silver thread wound around silk employed for ordinary gold lace is not used: but the flattened wire of gold or of silver.

(37). But aw'd and terrified at sight of good Russaloo's bow
Back to the darkest gloom retrace his step with hideous roar,
Which rocks the mountain to its base, and thrills th' affrighted shore.

It is a very remarkable circumstance that until within the last fifteen or twenty years, the mountain of Gundgurb used at intervals to utter, or seem to utter, a roar as of distant thunder. Numbers of persons are living, who testify to have heard this sound even to the distance of sixty miles from the mountain. They say that it was distinguishable from thunder and from all other sound, and not attended ordinarily with any tremor of the earth. Yet the mountain which is a peak of blue mountain limestone jutting through a long ridge of black clay-slate permeated with veins of white quartz and sulphate of lime, shows no trace of volcanic agency. The emperor Jehangeer mentions this bellowing of the mountain, which he calls Gurj Gurb, or the house of thunder, and doubtless Gundgurb or the naked house is a corruption of this. The sound is universally ascribed to the imprisoned Rakuss, who utters it every time he retreats from the sight of Russaloo's bow.

I account for this sound and its sudden cessation in the following manner—Gundgurb is the last mountain of the long deep trough of the Indus. Sounds uttered in narrow passes of that trough are multiplied like the human voice in a speaking trumpet. The last wave of sound is reflected from Gundgurb, the last mountain of the chain. It seems to people of the plain to be the utterance of the mountain itself.

About 150 miles above Gundgurb, the Indus cleaves the snowy Caucasus, being searped on either hand by gigantic cliffs—large masses of these cliffs plunging into the deep stream created a wave of sound which was borne onward by the conducting agency of the mountains on either hand, and eventually came to the plains reflect-

ed from Gundgurh. But about A. D. 1839, an enormous mass of the overhanging cliff fell into the river channel, so as to dam up the river for months; until the overflow of the accumulated waters brought down the dam and deluged the entire valley, carrying away alike the rock, the forest and the very soil. The fall of this mass was either the work or the cause of an earthquake which was felt to the distance of 150 or more miles.

It is easy to suppose that such a fall would bear with it all the crumbling masses of the cliff, and leave a clear and solid scarp which, for many years, would not shed any considerable mass into the river.

The following is the legend precisely as I took it from the lips of a minstrel, when shut in by the snow in a ricketty and dark bastion of one of the rude castles of the Dhoond mountains.

Recitation.

Rajah Russaloo son of Rajah Sala Byne was sleeping in his tent in the castle of Sialkot when the Punjpeer* appeared to him in a vision and said "Go thou and slay the Rakuss," so the Rajah went to Ooda Nugr and alighted at the abode of an ancient woman. She was cooking bread, but the whole of her mohulla (ward) was desolate, and sometimes she wept and sometimes she sang. And in that city the inhabitants sent daily a buffaloe, loaded with bread and a human victim to the Rakuss as his rations, otherwise he would have destroyed the city. And the Rakuss dwelt in the Barrh or wilderness west of the city; and the Rajah address the woman, thus:

(Chaunted to music.)

Oochcheh mundul mata marria do russ killah bazáar,

Kye ra sub dur disn sukna kavur lisseh sunsar

Natoo rooh my booddiah, hunjoo na dul karr,

Jie rub rukh si terá bétéra my sír deh sa char.

She replies.

Sut bété Raja Jee, my jahch, kye n'h keeta kahj,

Aikulla betá rehguja, oosdi bárí† ahj,

* Five Muhammedan saints: Bhawulnug of Mooltan, Shah Rooka Aulum Huzrut, Shah Shumse, Mukdooom i Jehánia Jehangusht and Baba Sheikh Furud Shuk'r Gunj.

† Bari is a peculiar word, denoting the lot of a sheep or other animals for slaughter.

Neela ghorawallah shuksa, too moohndári sir pug,
Jereh zalum soohj deh aah ! phiraini uj.

Then on the morrow, Russaloo departed in company with the old woman's only remaining son, who was mounted on a pony, and who drove a buffaloe laden with bread. And they reached the Neel Rao river, and Russaloo stripped to bathe. And the sound of thunder was heard in the clear vault of heaven, and fear fell upon Russaloo and the child. And from the forest appeared a column of cloud stalking forward to the spot, and lightnings and thunders proceeded from it. And it paused at the river brink, and an arm huge as a palm-tree was stretched forth with its mighty hand to seize the youth. But Russaloo drew his sword and severed the hand from the arm. And the Rakuss uttered a dreadful roar and fled, and his brothers and sister came to see what was the matter—and as they met their bleeding brother, they saw Russaloo with his naked sword, and fear fell upon them because of a prophecy, which said that the son of Sal Byne should destroy them, and one of them said to Russaloo—

Kahan toomhari vutn hy, quon nugri shihr, graon ?
Kis Rajah ka too bété ra, k'a toomhara nam ?

To which Russaloo answers—

Huz'rut Sialkot ma wutn, woohi nugri shihr, graon,
Sala Byn da my bété ra, Russaloo mera nam.

The answer causes great dismay, nevertheless one of the brothers advances to the combat, but is slain by one of Russaloo's fatal arrows ; and another, Pehoon, is wounded and flies to Gundgurh. Pugrputt also flies, but being hotly pursued, utters a spell and is instantly enclosed in solid rock.

And Russaloo saw in a dream that the Rakussnie Bééra was concealed in the forest, and he came upon her with a drawn sword, and compelled her to teach him the spell by which Pugrputt her brother might be drawn from the rock. And Russaloo muttered the spell, and thunders pealed and Pugrputt came forth, and Russaloo slew him with an arrow.

And Bééra said to Russaloo, Behold I am beautiful, make me thy wife. And Russaloo consented, and as they walked with infolding arms around the caldron of boiling oil (a nuptial ceremony of those

days), the Rakussnie who was very strong tried to hurl Russaloo into the caldron, but failed. And Russaloo hurled her in and cut off her head.

And he mounted and rode to Gundgurrh, whither the first Rakuss had fled. And the Rakuss Tera, burrowed in a cavern of Mt. Pîr Than. And when Russaloo found that he could not get him forth he hung his terrible bow of steel in the cavern's mouth. And whenever the Rakuss would come forth, the sight of this bow sends him back howling to his retreat. And many who are living have heard his voice, and I amongst others : it is like distant thunder. But the last twenty years, it has almost, if not wholly, ceased.

And many other acts were performed by Russaloo contained in other traditions and songs, and the steed of Russaloo still stands caparisoned in a cavern at the summit of mount Sirbonn, waiting for his master.

Some bards add the following preface to the legend, which is curious in many respects. It shows the succession of the Jusrut to the Pandoo rule, and the employment by the bards of strings of metrical aphorisms, no way connected with the tale, as introductions to their ballads.

Ulla dehvari. Uvl bóoti Pándoon, pheer booti Jusrut,
 "Mairi mairi kur gyée," toor kisi nuggeh hut,
 Sumbhul ki, to buddia kia? Kooah jis ki mooshk nhvass,
 Gidr ko, to, sut nhvye, jis da nhkul, nh mahss,
 Puttr ko to pálá kia? Khoosré ko kur wass?
 Undé ko chanoon kia? toorreh deveh bullun punjahss
 Moorook manoo admi hust mooeeka (wuh) mahss
 Sussoo bahj nh sahoreh, huldi bahj nh mahss,
 Bahj subooneh, khupra, trieh t'hohk n'h rahss.
 Uk n'h kurrieh dundna, sup n'h khyeh mahss.
 Narr nh kurrieh lahdleh, nh hassoh kurreh bunahss.
 Jumme si, to, sut guz, bur jo bun guz to charr,
 Piu, pootre, mojah lehguaya do-no aik sh' narr
 Koloo koot'rr lehguaya, chukki lehguaya khán
 Taili káti ninglia, chowrasi hurff graon.

Russaloo thus addresses the ancient Dame, whom he finds in the desolate city.

Oochcheh mundul mâtá mariáh, do russ killah bázaar,
 Kye ra sub dur disn sukna, k'a vur lisseh sunsar
 Natoo rôoh my Booddiah, hunjoo na dul kar,
 Jie rub ruksi téra bétéra my sir deh-sa char.

She replies—

Sut bété Rajah jee, my jahch, kye n'h keeta kahj
 Aikulla beta hoon rehguva ossdi bari ahj,
 Neela ghorawala, shuksa, too moohndári sir pug
 Jereh zálum sooj deh aah! pheeraini uj.

I cannot answer for more than the general accuracy of the following translation, for the tradition not being written, it is difficult to catch the precise sound of the words as uttered in recital, and the bards become puzzled and bewildered if asked to explain their meaning. Several of the words, none of those whom I consulted, could translate: it is probable therefore that they were mispronounced in recital.

First were the Pandoos; after them the Jusrut.
 (Each said "the world) is made mine own." Yet none remains to either of you.

What harm is there in arsenic, or the well* whose odour is rotten?
 Spare to beat the jackal, that hath nor hide, nor flesh.

What careth the rock for frost? The eunuch for matrimony?
 To the blind what profiteth the lamp, tho' you should light fifty?
 Man is an ignorant compound of hair and flesh.

The mother-in-law† without her son-in-law, meat without huldi,
 Clothes without soap.—These three things are amiss.

Bring not the swallow-wort to your teeth. Eat not the flesh of snakes.
 Weep not despondently, nor laugh overmuch,

Born an infant of seven ells, would you grow into a man of four?

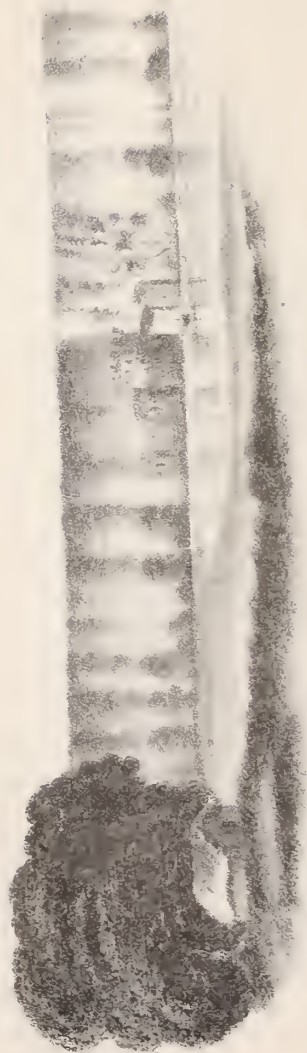
The father hath entered his son's boots, one measure serves for both,
 The dog hath run off with the sugar press, the khán hath seized the
 milstone

The worm hath eaten the saddle of the village of 84 figures‡ (in
 letters).

* Some translate Kooah. Stomach.

† Alluding to the custom of treating the mother-in-law with marked tenderness and reverence.

‡ Meaning perhaps, grandiloquent name.



J. A.

Common variety of India

Russaloo addresses the old woman.

Lofty mansions, mother mine, on either hand, fort and bazaar,
No living thing salutes mine eye. What hath caused this desolation?
tion?

Weep not old woman. For tears there is no need.
Since God hath placed your son (under my protection) I will give
my head for his.

She answers—

Seven sons, O Rajah, were born to me. None had wedlock known,*
One only son the rest survives,—To-day his death lot's drawn.
O! Rider of the dappled grey, thou bearded, turban'd man,
The worker of this cruel wrong, returneth here to-day.

Another of these traditionary ballads opens with the following
exquisite address to the Popeeia, which however has no relation to
the tale.

Sawun, Sawun, too kahoh, pee, kurunta pee;
Tainko Sawun k'a kurréh, jin ghur n'h byl n'h bee?

Harvest, harvest, dost thou sing Popeeia peeia pee?
What, thou who hast nor ox nor seed, shall harvest do for thee?

The Popeeia's note is a repetition of its own name running from
the lowest to the highest scale.



On the Mirage of India.—By Major JAMES ABBOTT.

Few have traversed the plains of central India without being struck
by the appearance of distant cliffs—sometimes also of towns and
forests, seen shortly after the rising of the sun, but which they have
vainly looked for later in the day. I first observed this phenomenon
in October 1829, when marching with my company from Kurnaul to
Mhow in Malwa. Several times on reaching camp, I found it pitched
in a plain, walled apparently to westward by lofty (See Pl. VI.) cliffs
which had an inviting aspect. Several times I promised myself
that in the afternoon I would pay those cliffs a visit. But, when-
ever I would accomplish this design, I found that the cliffs had

* This again alludes to the Hindi custom of showing extraordinary affection
and attention to a mother-in-law. So that the son literally leaves father and
mother and enters his wife's house. The widow here was peculiarly blest in her
sons, because none of them had thus left her.

entirely disappeared, and I questioned whether I had not been suffering some illusion of the eye or mind : for I was not then aware that Mirage is known in India. A residence in Malwa, where it is common, made me familiar with some of its phases, and as I have never met with an intelligible description of the process of this illusion, a slight sketch may be acceptable to the general reader.

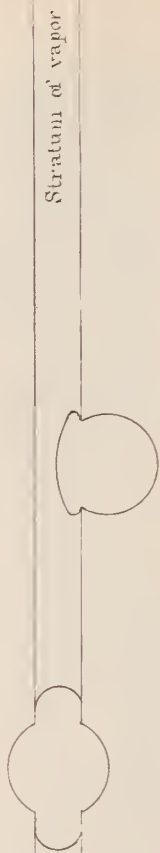
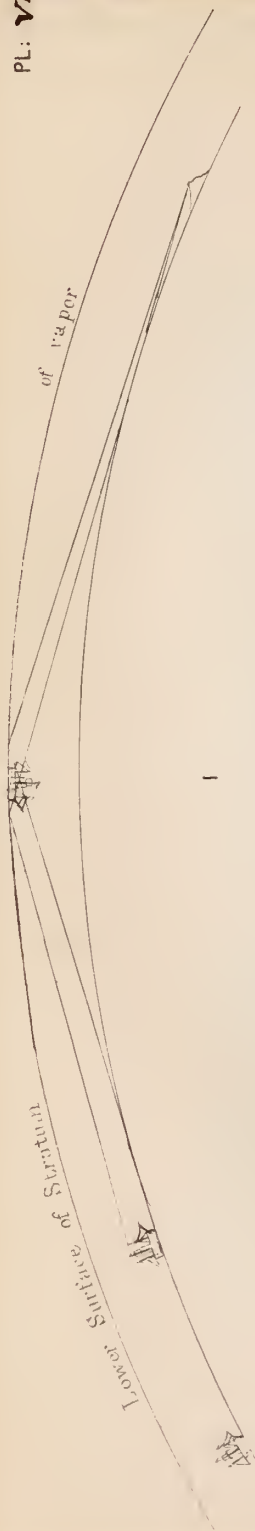
The Mirage most commonly observed in India is the effect produced upon distant objects, by means of a mirror, suspended with its surface downwards at the distance of from 60 to 250 feet from the earth, half way between the object and the eye of the spectator. This mirror is a stratum of dense but transparent and scarcely visible vapor, evolved from the dewy earth by the action of the sun's rays, generally about an hour or two hours after sunrise. The refractive power of this vapor being greater than that of the atmosphere, acts precisely as would a mirror of glass similarly suspended : that is, it catches the reflection of distant objects and exhibits them hanging in reverse. But, being slightly agitated by the air and by the action of the sun upon its upper surface, it slightly confuses every outline ; giving a wavy appearance, as we see in images reflected by a running stream. And as the reflected image is seen in juxtaposition with the substance : and as the stratum of vapor is connected with the earth, by less dense currents rising up to join it, it follows that the lower portion of the reflection is prolonged downwards until it meets the summit of the substance. The substance and its reflection are thus blended together at their respective summits : a respect in which Mirage differs from the reflections in a clear lake. The object and its reflection in the latter meeting together at their bases respectively.

I have described the stratum of reflecting vapor as hanging midway between the object and the spectator ; because this its position is essential to the production of Mirage. But generally the vapor hangs in one continued canopy from the object to the eye of the spectator.

This reflecting canopy exhibits the images of distant objects alone, because its substance is not sufficiently dense to repel those rays of light which fall upon it at any sensible angle of incidence. It is only when the angle of incidence is extremely small, that the ray will rebound from the surface of the vapor. It follows that supposing the strength of illumination sufficient, the image will be distinct in proportion to the distance of the object.



Mirage of a city hidden in the convexity of the Earth



Rays of illumination

The ordinary Mirage of India occurs at distances of from three to eight miles. But from the foregoing observations, it must be manifest that the effect may be produced at distances so remote, as that the substance is completely hidden in the convexity of the earth, and only the reflected image is seen suspended in the air. Of such an effect the Fata Morgana are an instance. And the pictures of coming vessels hanging in the clouds, as seen from the Isle of France, are another. See Pl. VII. and Pl. VIII. fig. 1st.

In order to witness the Mirage, it is necessary, I believe, that the back of the spectator be turned upon the sun, otherwise the light reflected from objects in the landscape, will not be sufficiently strong to reach the eye after a second reflection from the canopy of vapor.

It is impossible to give any adequate idea of the appearances exhibited by the Mirage, without the aid of colours. In India the most general appearance is that of a long range of cliffs standing to westward of the spectator. These cliffs are of so substantial an appearance so marked with rents and fissures, so tufted with bushes, shrubs and lichens; so clear and distinct of outline, that it is scarcely possible for an unpractised eye to doubt their reality.

The effect seems to be produced thus. The mass of the vapor being transparent, reflects objects not only from its lower surface, but throughout its substance. Where the reflections terminate, near the upper surface of the stratum, a succession of terminations in a horizontal line give the appearance of a horizontal ledge or table from which hang reversed the reflections of all the images in the landscape, most strongly delineated above (i. e. near this ledge) and decreasing in distinctness downward. Just before their termination, they are met by the summits of the objects themselves, and together they form a faithful representation of the shadows and stains exhibited by cliffs. Trees are the objects most commonly pictured by the Mirage; the darkness of their hue enabling them to be seen at long distances. These when large, form gigantic columns of dark shadow, melting wavily into the substances of which they are the reflections. But sometimes the monotonous aspect of the cliff is diversified and enlivened by the presence of a white town or of moving objects. Every stump of a tree becomes a palm or a column. Every little bush becomes a tall mass of foliage. The imaginary cliffs are clothed with the richest

verdure, stolen from green corn fields drawn up aloft as by enchantment to garnish the fairy structure. Small, white, moving figures, otherwise scarcely noticed by the eye, become stalking ghosts whose heads are lost in ether. Villages far buried beneath the convexity of the earth's surface are seen hanging reversed in the air, and should any small river with its boats be flowing there, all the shifting scenery would be presented in the clouds: the white sails, greatly magnified, and distorted, having a truly spectral appearance, as they hover silently by.

With respect to the Mirage of the Isle of France, the vapor hanging over the sea is probably more transparent and of higher elevation than that which overhangs the land. In this case the sails of a vessel brightly illuminated by the sun, might be seen at the distance of a hundred or more miles. If at a hundred miles, then the reflecting canopy must be distant fifty miles from the spectator's eye. The canopy is not a perfect plane, but is a mirror slightly concave answering to the convexity of the earth. The image therefore would probably be magnified in the concave mirror which would somewhat balance the loss of size sustained in transit from so great a distance. The vapor is not visible excepting by its effects. Visible vapor does not reflect a perfect image of any object. The same difference seems to exist between visible and invisible vapor as between snow and ice. The first is opaque and unpolished, the latter polished and transparent. And the proper distinction perhaps were to call the first mist, the latter vapor.

I one morning in November observed the sun rise through a mirage vapour. As the upper limb reached the stratum, it was drawn up from its convexity, was straitened and distorted. When the vapour cut the centre it presented the appearance delineated in Plate VIII. fig. 2nd. Yet the brilliance of the disc was little impaired in the centre.

Owing to the necessity of a clear substratum of atmosphere, it is seldom that mirage can be exhibited over a large city. But when once acquainted with its laws and phenomena, it were easy to imagine the glorious apparition which such a city as London would present reflected in mirage. If seen from a considerable distance, the whole city would seem inverted and suspended from the clouds. The spires and domes and towers would be drawn downward toward the earth.



How Church in mirage from memory

The moving population magnified to giant dimensions and deprived of all distinctness of outline would appear like a dense mass of spectres called from the antipodes or from Hades. The Thames would streak the clouds with its pitchy waters and the ghost-like array of ships would glide aloft among the clouds throwing down from their sails long wavy columns of light, terminating on the earth.

The effect of mirage is greatly enhanced by the use of a telescope which without unravelling the mystery, brings nearer the objects, each in its proper hue, and greatly increases the beauty of the exhibition.

I have hitherto spoken of the most common species of mirage, viz. that which is produced by a reflecting stratum of vapour suspended overhead. But I have witnessed another variety, viz. that in which the reflecting surface lies below the object and the spectator's eye. This can be seen only where inequalities of surface occur. I first observed it at the military station of Mhow in Malwa. In riding home at midday in the month of March, when approaching the cantonment from the southern heights, I saw the church vividly reflected from a wavy vapour, hanging over the lower ground: the church itself standing on an eminence. The effect was precisely that produced by water upon objects standing beyond it, excepting that the strong undules of the vapour did not much disturb the accuracy of the reflection. I have since observed the same effect elsewhere, but not in so remarkable a degree, see Pl. X.

I have also observed upon the Nurbudda and other large rivers that, whereas the nearer current is too rapid and turbid to reflect the rocks upon its banks, the more distant current, equally rapid and equally turbid, presents a perfect reflection of the banks without any waving of outline. This may be attributable to the transparent vapour, ever hanging over streams, acting as a mirror to reflect surrounding objects. Or it may be, that the illuminating rays falling upon the ripples at a very small angle and meeting several successive summits in almost the same line, pursue their onward course almost as from a plane, instead of being dispersed or thrown back by the irregularities of surface. Thus, if the angle of their incidence be of 10 degrees, one or two rays, insufficient to impress the retina of the eye, may be all that reach the organ of vision; the rest being dispersed on all sides. But if the angle of incidence be of one degree, one ray will

meet the eye from one ripple, another from another ripple, with no appreciable difference, and the aggregate will suffice to paint an image upon the retina, see Pl. VIII. fig. 3.

There are other effects of vapour less known than those above described. One of these, is to magnify greatly any object seen through the medium. This may sometimes be affected by scattering and disordering the image: but is, I think, more generally a mere illusion occasioned by exhibiting the figure with a faintness of outline as if seen at remote distance, without any diminution of apparent bulk. Thus, in crossing the desert on my approach to the Bolaun pass, I saw by moonlight a camel magnified to gigantic dimensions: an effect, which I am inclined to attribute to the figure being dimmed by mist, so as to appear remote, when it was really close to the eye and subtending of course a considerable angle. The soft fall of the camel's foot upon sand creates no sound and adds greatly to the effect.

An illusion of the same character I have elsewhere seen beautifully exhibited, viz.: upon the highest summit of the Simla mountain. There, as I have sat gazing upon the glorious landscape, it has been gradually removed to immeasurable distance by a transparent and imperceptible vapour, which crept up from the valley over the mountain brow; and which as it gradually rolled past, as gradually brought back objects to their original proximity, with an effect truly magical.

That species of mirage so often described by travellers of the desert I have not mentioned, because I have not met with it under circumstances favourable to an examination of the phenomenon. I allude to the appearance of water in spots utterly dry, an illusion to which even the most experienced are at times liable; so perfect is the resemblance. This mirage appears to be an isolated stratum of almost transparent but dense vapour occupying accidental hollows, depressed beneath the observer's eye. It is commonest at night in India. The vapour thus accumulated having a higher refractive power than the atmosphere, not only has the gleam common to water, but reflects images of objects beyond it, precisely after the fashion of standing pools. It appears to be commonest in saline deserts, where the extreme heat evolving particles of salt in solution with the vapour, forms a vapoury stratum of greater density than that arising from pure water, and of course of higher refractive power. The effect exhibited in



A Lake city as it might appear in Mirage

pl. IX. is of this character; the reflecting medium lying below the object and the spectator's eye. But in the case of the Mhow church, the phenomenon is aided by an elevation of the object above the intervening surface of the earth.

Thus far had I written in Huzara, where I had no opportunity of reference to books. Since my arrival in Calcutta I have referred to Brewster's treatise on mirage. He seems there to attribute the kind first noted by me to the reflection of the image from a denser stratum of *atmosphere*; although he is treating of observations made at sea. This is I think a mistake. The reflection of the sun's rays from the surface of the ocean can scarcely be sufficient to heat the atmosphere in contact to such a degree as to cause a perceptible deficiency in its density below that of the incumbent strata: and, were it so, the stratum thus rarified would immediately ascend. It is undoubtedly a stratum of vapour which forms the mirror, and its presence in that position is thus to be accounted for.—

At night, the mist, parting with its caloric, becomes specifically heavier than the atmosphere, and settles on the earth. There on clear nights the radiation of the caloric from the mist to the vault of heaven, precipitates it in dew upon the earth. Again when the sun rises, the earth's surface imbibes the rays and the dew is evolved in vapour which at first is transparent.

This vapour being of rather less specific gravity than the lowest stratum of air, rises above it, until it meets with a stratum somewhat elevated, which the reflected heat from the earth's surface has not tempered. To this stratum it parts with a portion of its caloric until its rarity is so much abated that it cannot ascend higher; and it then hangs like a canopy in the air, continually increasing by additions of vapour from beneath, but as continually decreased by the escape of particles above. Accordingly the phenomenon is only or chiefly observable from the 1st to the 2nd or 3rd hour after sunrise and when the nights are rather chilly and the skies clear.

Brewster mentions the reflected image (in the atmosphere) of a ship and of the ship's shadow or image in the water. This I presume could be exhibited only from long distances and when the illumination is very strong. I have never observed it.

On NEPAULITE ; a New Mineral from the neighbourhood of Kathmandoo.—By HENRY PIDDINGTON ; Curator Museum Economic Geology.

In my report for February, I mentioned that General Jung Bahadoor had sent us a large collection of ninety-six kinds of rocks and ores. Amongst these, several required careful examination and that more than once repeated, that nothing, even in minute traces, might be overlooked from a country so little known to us.

The greater part however proved valueless, but I announced that there was *certainly* one new mineral, but was unwilling then, as it had been sent to us in the smelted state, to say what it contained, as I was in hopes of obtaining proper specimens of the ore.

The history of this mineral as described by Major Ramsay is, that it had been found in considerable quantities not far from Kathmandoo ; and that the Nepaulese, thinking no doubt from its resemblance to some varieties of Magnetic Iron ore, (though it is not magnetic,) that it was iron, set about to smelt and cast it into cannon balls, which they could easily do as it is very fusible ; but then, when the cannon balls were fired they flew all to pieces ! to the great surprise and discomfiture of the smelters no doubt.

At my earnest request, Major Ramsay procured for me a quantity of the ore, which was sent down to us, but on examination this lot proved to be merely the rubbish of the mine ! with only here and there bits in which specks, and minute nests, and thin veins of the true ore were to be seen ; some useless lumps of pyrites forming the bulk of the parcel ! All this was evidently a trick of the minister's people to mislead us, as their metallurgical skill would be brought into disrepute if the Feringis found any thing extraordinary in this new, and to them strange ore.*

I explained this to Major Ramsay, and he has kindly obtained and sent down to us, from the minister himself, several parcels of the ore in its matrix, in which I have also found two other products

* The presence of cerium makes it a new ore, but its appearance and streak at once shewed that it was a bismuth or antimonial copper, and thus not *strange* to us, though evidently peculiar.

of this singular mine, which I shall afterwards describe; though I do not think we have yet got the largest sized veins or masses of the ore, or all the products of the mine; for I have one specimen of blue copper ore, which, as well as the green carbonate, is traced in some of the specimens.

I now proceed to describe the ore itself and its analysis.

EXAMINATION OF NEPAULITE.

Description.

1. *External Characters.*—The matrix of the ore should be first described. It is principally quartz of all varieties, from the clearest translucent, to the dullest granular and milky kinds; but all are beautifully stained with the fine turquoise blue of the copper which the ore contains; and the matrix is again varied by nests and plates and even layers of another bright fawn-red ore, which here and there looks like a pale red sandstone or iron ore, but which is a silicate of Cerium and Iron (Cerite?) so that altogether it forms one of the most beautiful and showy of mineral ores, and will, I doubt not, be highly prized amongst collectors. Sometimes the red ore is absent, but the siliceous matrix is almost always stained with some shade of blue, and at times has minute mamillated crystals of the pure Azurite (blue carbonate of Copper) on its surface. Here and there chlorite and talcose schists, and felspar appear, but not in any quantity, though the mine is probably situated in a formation of one or both of these rocks. In picking carefully over every fragment of the rubbish, which I never fail to examine closely, I found a small portion of a third ore also, an ore of Cerium (Allanite?) which will be described in its place: I return now to the Nepaulite.

The ore is massive without the remotest trace of crystallisation.* It occurs in veins, mostly in quartz, from six-eighths to one-eighth of an inch in thickness, or smaller; we have indeed but one piece of the thicker kind, and though the thin veins are tolerably pure, the thicker ones have almost all mixtures of imbedded, or veinous, or granular quartz, so that it is very difficult to procure a pure bit

* The fused ore shows at times some of the hackly, semi-crystallised fracture of bismuth; though it is mostly granular; but it is of a pure silvery white colour; rarely showing any approach to the yellow white of bismuth, but sometimes is a little brassy from the copper.

of it for taking its specific gravity : the quartz matrix too is excessively adherent.

In external appearance it resembles exceedingly some of the varieties of granular and massive plumbago, or antimonial ores, which, at a first glance, and where the quartz matrix has no blue stain, it might well be mistaken for.

The fresh fracture is of course somewhat brighter and more steely than the old surface, which like that of the plumbago ores is of a duller black, though always with a good metallic glance ; and is small grained, somewhat inclining to hackly, and even at times slightly foliating.

The fragments are of all shapes.

It is completely opaque.

The streak is a dull black, with here and there a bright metallic glance and altogether that of the inferior graphites.

It does not soil or mark.

Its hardness in the perfectly pure specimens ; for quartz is, as before said, so very frequently present, that care must always be taken, is 5—6 ; apparently depending upon the silica found in the specimens ; yielding a little, but not very easily, to the knife, by which it may be scraped smooth, but not cut.

It is easily frangible, and rather brittle, but the latter portions even of the pure mineral, are somewhat difficult to pulverize. The powder is of a dull grey black, slightly glittering in the sunlight : It is not magnetic.

Its Specific Gravity, carefully taken from a nearly pure specimen is 4.50. at Temp. 80°.

The Specific Gravity of the fragments of the cannon balls sent us from Nepaul, and which had been of course fused, is 8.1.

Chemical Examination.

Before the blowpipe, it fuses easily and spreads out, the Bismuth however does not separate from it, to form the usual deposit on the charcoal, but when the fused mass is highly heated a slight sublimate is seen to rise.

In the open and closed tubes, no sublimate is obtained even at the melting point of the glass.

When the pulverised mineral is heated in an iron capsule, it be-

gins to give off the white fumes of Bismuth about the low red heat of the iron ; and at the cherry-red heat, it begins to aggregate before running ; but it would seem that all the Bismuth is not driven off ; as it is found also, as well as the Cerium, and of course the iron, in the fused mineral.

In ascertaining its component parts, extreme care was taken to pick minute fragments which were again carefully examined by the magnifier in order to exclude as completely as possible, all mixture of the siliceous and Cerium matrices.

It dissolves in all the mineral acids, and always with considerable effervescence, like a perfect carbonate, which it is. The nitro-muriatic acid was however found to be preferable for analysis, as the bismuth can be almost wholly separated by the first operation.

It was found to contain in 100 parts.

Metallic about

Sulphur,	1.	60.		
Silex,	3.	60.		
Carbonate of Protoxide of Bismuth,	34.	80.	24.	6.
Carbonate of Copper,	22.	96.	14.	40.
Per-Carbonate of Iron,.....	25.	62.	9.	21.
Ox: Cerium,	9.	40.		
Lanthanum ?	2.	80.		
<hr/>				
	100.	78.		

I also found, both *via humida* and by amalgamation, that the ore contains a minute portion of silver, but in too insignificant a quantity to make it of any importance.

It follows, then, that we have here an entirely new mineral of Bismuth, Copper, and Iron, with Cerium and Lanthanum,* and it will be recollected, by those conversant with mineralogy, that the Bismuth copper (or cupreous bismuth) ores, are all in the state of sulphurets, and not of carbonates, amongst which there is nothing which approaches to this compound : in which again the Cerium is certainly not a fortuitous addition, but a part of the pure ore ; and we have thus a full right to claim it as a new Indian mineral. I have therefore called it, from the country of its origin NEPAULITE.

* I have for the present called this product Lanthanum, but am not perfectly satisfied that it is so.

Bibliographical Notice.

Histoire de la vie de Hiouen Thsang et de ses voyages dans l'Inde, depuis l'an 629 jusqu'en 645, par Hoëi li et Yen-thsong ; suivi de documents et d'éclaircissements géographiques tirés de la relation originale de Hiouen Thsang ; traduite du Chinois par Stanislas Julien, membre de l'Institut de France, des Sociétés Asiatiques de Paris et de Londres ; correspondant des académies de Berlin et de St. Pétersbourg ; professeur au Collège de France, &c. Paris, imprimé par autorisation de l'Empereur à l'imprimerie impériale, MDCCCLIII. Chez Benjamin Duprat, libraire de l'Institut, &c.

It is the translator's wish that his work, the subject of which has been more than once discussed in this Journal, should be pronounced upon 'par une personne versée à la fois dans la connaissance de Sauskrit et de la Géographie de l'Inde Ancienne.' While we hope that this wish may be responded to by the competent scholar who has already (Vol. 17, Parts I. and II.) stood forward on behalf of the Chinese Pilgrim, we shall at once publish the opinions of European orientalists on M. Julien's work.

Lassen's praise of it is unqualified, and as his review cannot but be read by all with the greatest interest, we have translated it in *extenso*. We will afterwards quote from Mohl's Annual Report, read on the 13th June last, at the 31st Anniversary Meeting of the Société Asiatique, and from Weber's paper entitled, 'Late researches in the field of Buddhism,' published in his own *Indische Studien*. Vol. III. Heft. 1.

"All friends of Indian antiquarian researches will" says Lassen, "welcome the appearance of this long-expected work, which far surpasses in importance all contributions to our knowledge of India hitherto brought to light from the rich mines of Chinese literature. The exemplary accuracy of the translation, the distinguished individuality of the traveller and the valuable contents of the work, ensure it this eulogium.

"An exact translation of Hiouen Thsang's journal offers to an imperfectly qualified translator two almost insurmountable difficulties.

The first consists in the style of Hiouen Thsang, which often renders it impossible for a scholar acquainted only with the classical Chinese, correctly to understand the text; the second is caused by the numerous Indian words which are either transcribed in Chinese characters or translated into Chinese. Stanislas Julien being unanimously regarded as the first of living Sinologists, and as the scholar who has proved himself to possess the most thorough and comprehensive knowledge of the Chinese language and literature, his translation can be admitted with full reliance on its accuracy, an advantage which does not attach to most communications derived from Chinese sources through other Sinologists. Even Abel Remusat's translation of passages of Hiouen Thsang's work is by no means free from errors, as is shown by several citations (Pref. p. x.) by Stanislas Julien. How indispensable an intimate acquaintance with the Chinese language is to guard against serious errors, the following is a striking example. Hiouen Thsang distinguishes explicitly in his journal those countries which he had visited himself from those of which he had only heard from the mouths of others. This distinction is prominently mentioned in the appendix to *Si-jü-ki* or *Notice of the western empire* (Pref. p. xxxvii.) Abel Rémusat as well as Klaproth misunderstood these two passages, and the latter misled by them, made Hiouen Thsang travel to Sinhala or Ceylon, and from thence return to the mainland. Stanislas Julien on the other hand has, in printing the list of one hundred and thirty-eight kings mentioned by Hiouen Thsang, separated the twenty-eight of which the latter had only oral information.

"The second difficulty is scarcely lighter than the first, and attends the accurate restoration of the numerous Indian words which occur as well in Hiouen Thsang's own journal as in the history of his life and travels, written by Hoei-li and Yentsong. Stanislas Julien met so many obstacles in his first attempts to restore these words in his translation of the first; that he resolved in 1839, to stop at the 4th book, and not to continue it till he should succeed in discovering a sure method for restoring both kinds of Sanskrit words above mentioned. To form an idea of the great difficulties attending the successful execution of such an undertaking, one must consider how awkwardly the Chinese language

can be made to express properly the many sounds of the Indian alphabet, and at the same time bear in mind that the Chinese translations of Sanskrit words frequently offer no clue to the selection of one of several Sanskrit synonyms in translating the word back into Sanskrit. This uncertainty of choice is augmented by the circumstance that Buddhists when writing Sanskrit now and then use words in a sense differing from that attaching to them in the classical idiom. In order to find the word which and which only would correspond with that of the Chinese text, examples required to be collected which admitted of no doubt, and which would serve afterwards to decide the meaning in doubtful cases. These examples occurring in Chinese-Buddhistical works must have become very numerous, for since the end of the second century A. D., when the translation of Indian books into the language of the celestial empire first commenced, five classes of Indian words had become fixed by unalterable rules, and, for various reasons, could not be translated into Chinese, but only admitted of being transcribed in Chinese characters. Stanislas Julien has given a detailed notice (Pref. p. xvii.) of his labours to secure a sure guide for the restoration of the two different kinds of Sanskrit words. The means which Chinese literature afforded to him were two-fold; Syllabaria, in which Indian words are transcribed in Chinese characters, which however being incomplete were but of little assistance: and Vocabularies, in which Buddhist expressions are explained, and which were of course most useful. Besides a very imperfect vocabulary available in Paris, Stanislas Julien made use of two rare MSS. of this kind belonging to the Arabic Department of the St. Petersburg library. One of them contains an almost complete collection of the sounds and their meanings of such Sanskrit words as occur in the sacred writings of the Thang Dynasty era and is the compilation of Juen-sing (about 649 A. D.) who was employed as a translator by the convent of Great Beneficence and was a fellow-labourer with Hiouen Thsang. The second vocabulary furnished a collection of Indian names translated into Chinese, and is the work of a monk of the convent King-te-the between the years 1143—1157. By comparing the numerous Sanskrit words and notes explanatory of them, contained in the above two MSS. Stanislas Julien collected a considerable stock of such

Sanskrit words as have been used in Chinese MSS. and of which about a quarter are known to have been correctly read. Extending his analysis to other Indian words, his penetrating mind has succeeded in compiling a complete Chinese Sanskrit alphabet by means of which he is in a condition to reduce with confidence to their Indian orthography all Indian words transcribed in Chinese characters. This discovery he first made known in the *Journal Asiatique* IV. Sér. X. p. 81 and he has since perfected it. This it was which enabled him to publish an index of nine hundred titles of Indian works translated into Chinese, viz. *Concordance sinico-sanskrite d'un nombre considerable de titres d'ouvrages bouddhiques, recueillie dans un catalogue chinois de l'an 1306, et publiee, après le déchiffrement et la restitution des mots indiens.* *Journ. Asiat.* IV. Sér. XIV. p. 353. By means of this index, a clear idea has first been conveyed of the richness of this branch of Chinese literature, as well as a foresight of the great use to which it may be turned in explaining Buddhism, if qualified scholars will but devote themselves to exploring it. The discovery of this trustworthy process of reducing Indian words transcribed in Chinese characters to their proper orthography, may be considered as an important advance in the progress of Chinese Philology, since it puts an end to the many mistakes and uncertainties on the part of earlier translators of Chinese works containing Indian words. In this as well as in all other translations by St. J. of Chinese reports on India, all Sanscrit words are found so exactly restored, that there is no room for doubt of their correctness, even where they are hitherto unknown geographical names. It is much to be desired therefore, that he may carry out his plan and publish his Chinese Sanskrit alphabet in order that other Sinologists may be able to make use of it.

“The restoration of Sanskrit words translated into Chinese, was attended by the difficulty already pointed out, that of discovering the right word from among various possible synonyms. Here also St. J. has done his best to be accurate. To words of which he entertained the slightest doubt he has with praiseworthy conscientiousness appended a note of interrogation. I can assert on my own experience, that he has always had good reasons for choosing his word, and that in cases where this does not bear its usual meaning,

great caution must be observed by those who are disposed to differ from him. With the exception of Burnouf, no other scholars have devoted themselves thoroughly to the study of Buddhistic Sanskrit literature* and it would add greatly to the reputation of St. J. if he would publish the collections which he has made of Buddhistic-sanskrit words.

“His profound knowledge and his talents render Hiouen Thsang the most distinguished of those Chinese Pilgrims, who under the influence of pious zeal visited India; and his long residence in, and extensive travels through this country, qualify him above all his countrymen to give an accurate and intelligent report of it. Descended from a distinguished family, he was born in 602, A. D. and acquired early in life a knowledge of the sacred Buddhistic writings, as also of the general literature and history of his country. He devoted himself with special zeal to the study of the works of Lao-tsen and of Tsheng-tsen or Confucius. In his 20th year he received the highest monastic orders. Subsequently he sought out all celebrated masters, conversed with them and examined their doctrines; but a comparison of their doctrines with those of the sacred writings convinced him, that there were most important differences between the two systems, and he was undecided to which to give the preference. He resolved therefore to visit Western countries, and to consult other learned men on those points which disturbed his mind.

“The object of this notice permits but few remarks on his travels. He left his native land in 629 and traversing the great sandy desert Schamo on the north-west boundary of China, arrived at the capital, of the Uigurs, which as well as its inhabitants are called by him I’gur and which is probably the modern Hami or Khamil. He then proceeded by Dsungarei and over the Musur Dabaghan, the northern extremity of the Tsong-ling or Belurtag, in crossing which, he encountered dangers and difficulties which are described with great graphic power. From the valley of the Jaxartes, situated westward

* Burnouf’s “Introduction à l’histoire du Buddhism Indien” is well known, as is his posthumous work, “Le Lotus de la bonne loi, traduit du Sanskrit, accompagné d’un commentaire et de vingt et un mémoires relatifs au Buddhism.”

of the Belurtag, he travelled through Bactria and Western and Eastern Kabulistan.*

"After visiting Kaçmira and the kingdoms of Western and Central India, Hiouen Thsang reached Magadha, the main object of his journey. This country which stands out so prominently in the ancient history of Buddhism, appears to have been then the principal seat of the doctrines of Çakjamuni. Hiouen Thsang found there a great number of sanctuaries and monasteries, in which resided no less than ten thousand monks, distinguished as much by their zeal in

* An error has crept into the review of Hiouen Thsang's travels (p. LII.) given in the introduction. The river Cubhavastee is not the present river Swan, called Soanos by the ancients, it is the Soastos of the ancients, and a tributary of the Pangkora called by the Indians Suvâstu, the present Suwad; see my *Ind. Ant.* vol. II. p. 132, No. 2, and p. 669. Therefore the capital of Udjâna, called Mung-kie-li by Hiouen Thsang, is not identical with Mougheti, which is situated N. E. of Attok on the road to Muzâffarâbâd. Hiouen Thsang confirms my former view that Udjâna is situated on the Suwad. It appears from page 84, that he proceeded from Purushapura or Peshawur over a large river which must be the Cabul river, to Pushkalavati the Peukelætis of the ancients, and thence to the town of Uṭakhaṇḍa, which according to his account was situated opposite to Attok, though the modern name of Attok is clearly derived from it. Hence he continued his journey over mountains and valleys in a Northerly direction and came to Udjâna. The distance of eight hundred li's, equal to about thirty geographical miles, is not too great if we consider that the road followed the windings of the valleys at foot of the mountains, which divide the Indus from the Suwad. As an additional proof, we may mention that the name of the capital of Udjâna is preserved in that of the village Mangalthan in the Yusufzye country (see Account of the Esafzai-Affghans inhabiting Sama (the plains,) Swat, Bunher and the Chamla valley, &c. By Shekh Khash Alea, in the *Journal of the Asiatic Society of Bengal* Vol. XIV. p. 738.) In the enumeration of the Yusufzye tribes, their villages and chiefs, the tribe of the Buner-valley is called the tribe of Sirdar Futteh Khan; that the inhabitants of the Buner-valley are meant by this designation is clear for the countries of the other three tribes are distinctly stated in the notes on the Yusufzye-tribes of Afghanistan by the late Captain Edward Conolly.—*Ibid.* IX. p. 924, Futteh Khan is mentioned as a powerful chieftain of the Yusufzyes, whose authority is also acknowledged in the valleys of the Suwad and Buner. The last named valley is situated east of the sources of the Suwad. According to Hiouen Thsang p. 86, the capital of Udjâna was situated 250 li or about 10½ geo. miles southwest from the sources of the Cubhavastee and therefore probably at the entrance of the Buner-valley from the Suwad-valley. Mangalthan is a corruption of Mangalasthana, the abode of delight; the ancient name was probably Mangala, delightful.

studying the sacred and other writings, as by their piety. He gives a more detailed account of this country than of any other in India. Here occurs the most interesting chapter in the author's biography, that in which he endeavours to give to his countrymen an idea of Sanskrit Grammar, with the rules and principles of which Hiouen Thsang after tedious study seems to have familiarized himself. The Chinese language being known to be deficient in grammatical forms, and even in expression for denoting them, the authors of the biography as well as Hiouen Thsang himself must have had great difficulty in conveying to Chinese readers anything like a clear representation of what the Sanskrit language was. They had to use words which in their own language were used altogether in a different sense, and sometimes they were obliged to give examples of grammatical definitions, scarcely comprehensible by Chinese, this being the only mode of conveying to their countrymen the meanings of the several terminations of nouns and verbs. It may reasonably be doubted whether such a meagre sketch succeeded in giving Hiouen Thsang's countrymen any idea of Sanskrit Grammar.

"After spending five years in Magadha, during which he acquired a complete knowledge of Sanskrit and of the Tripitaka or the three collections of sacred writings, and of other important Brahminical works, Hiouen Thsang determined on visiting those parts of India, which he had not yet seen. He first travelled over a great portion of Bengal and subsequently along the eastern coast as far as Dravida. This name is not used by him in its wider sense, as applied to all the countries where Tamil is spoken, but in its narrower sense as designating a particular kingdom of which Kánki on the Palar river was the capital. Thence he proceeded over the table-land of the Deccan to Konkana on the coast of Malabar. Subsequently he visited the northern countries and those situated in the valley of the Indus, and then he returned to Magadha, where an event took place which more than any other spread his fame in foreign lands. It is related with all its remarkable details at p. 211; we can only here give an outline of it.

"Hiouen Thsang had become very celebrated as well for his knowledge of the sacred books and of other writings, as for his philosophical doctrines, his pious life, and his ascendancy in controversy

with other sects. So much confidence had he inspired, that the disciples of a highly esteemed teacher, Sinharaçmi, deserted their master and joined Hiouen Thsang. The latter had composed a work in which the doctrines of the Mahâjâna Sûtra were declared to be the only true ones, and in which was exposed the fallacy of those of the Hînajâna Sûtra. The word Sûtra, as is well known, signifies with the Buddhists, the first part of their sacred writings in which are contained the sayings and lectures of the founder of their religion, his conversations with his listeners and all his instructions. The simple and earlier Sûtras are called Hînajâna or the little conveyance, the more detailed and later Sûtras, the Mahâjâna or the large conveyance. This work of the foreign Buddhist was communicated by a Brahman to Kumâra of Kamarûpa or Lower Assam, who was so pleased with it that he invited Hiouen Thsang to visit him. He accepted the invitation of the king, but Çîlâditya the more powerful ruler of Magadha coming to hear of it, Kumâra was threatened with his displeasure if he did not send back the celebrated stranger. Kumâra at once resolved in company with Hiouen Thsang to pay his homage to the king of Magadha. Çîlâditya received the foreign teacher with great honors, and being convinced of the excellence of his work, resolved to convocate at Kanyâkubja or Kanoj a great assembly of priests learned in the sacred writings from the several kingdoms of India, in order to discuss the true doctrine with the Chinese teacher. A great number of the most celebrated Buddhist priests and two thousand Brahmans accordingly assembled and Hiouen Thsang was made president of the assembly. For five days no adherent of the Hînajâna Sûtra ventured to dispute the correctness of Hiouen Thsang's dogmas, but the disciples of this school were highly indignant with him, calumniated him and conspired against his life. On this Çîlâditya issued an order to kill every heterodox teacher who dared to menace the life of Hiouen Thsang, and to cut off the tongue of such as slandered him. Those attached to the false doctrine were thus silenced and as during eighteen days none dared to oppose the foreigner, the assembly was dissolved. After obtaining this success his preaching and excessive praise of the Mahâjâna Sûtra persuaded many young men of opposite views to abandon the path of error and to turn into the right way. He received the honorific

title of Moxadeva, 'God of deliverance' and was overwhelmed by Çilāditya and Kumara with other marks of distinction. His reputation for talents and virtue was indeed spread far and wide by this achievement.

"The remaining events of his life p. 257, require but short notice here. After, nearly sixteen years' residence in different parts of India he returned to his country rich in knowledge and carrying with him a valuable collection of sacred books and several statues of Buddha, Çilāditya's influence so far as it extended, provided for the safety of his journey. A second time he traversed the interior of India the Panjab, Kabulistan and Bactria, but returning by a different route, he followed the course of the Oxus, and as far as we know was the first traveller who ever visited the high table-land of Pamer, where the Oxus issues from the lake Sir-i-cul. He sojourned for some time in the three well known towns of East Turkistan Kashgar, Jarkand and Khoten. Thence by a very circuitous route, he reached his native country, where he was received with great ceremony by the emperor Thien-nu-chiung-hoang-ti, then residing at Sojang. At the request of the Emperor he composed in 648, a narrative of his travels entitled Si-jü-ki, or rather to give the title in full Ta-thaug-si-ju-ki, i. e. a report on the Western countries published under the Thang. The sacred books and statues which Hiouen Thsang had brought with him, were preserved in the Convent of Great Benevolence. The Emperor moreover had a special building erected for him, in which to translate the sacred writings which he had collected in India. He translated into Chinese several most important works, the titles of which need not be mentioned here. He died in 661, and was solemnly buried by order of the Emperor at the public expense.

"From this biographical sketch of the Chinese Pilgrim, it will be seen that his acquaintance with the language and literature of India and his residence in that country, qualified him to give a very exact description of this country and of its then condition. The expectation which we formed of the great value attaching to a work drawn like the present from original sources is fully borne out. Still in judging its merits it must be borne in mind that Hiouen Thsang was a zealous disciple of Çâkyasinha, and therefore that he is not free from prejudice in dealing with subjects in which the interests of his faith are concerned.

"I turn now to the contents and character of the work, for the excellent translation of which we are indebted to Stanislas Julien. He mentions in the preface p. iv. all the accounts of India as yet ascertained to have been written by Chinese pilgrims, with particulars of their publication. The first of these is the well known work of Fa-hien, who commenced his journey in 399, and is called "Fo-kue-ki," or report on the countries of Buddha. The second work is entitled Seng-hoei-sing-he-si-jü-ki, and its authors are Hoei-seng and Sang-jün, who were sent to India by the Empress in 518, to collect the sacred writings; its title signifies Report of Hoei-seng and Sang-jün deputed to India. Of the third work Si-jü-ki, it has already been remarked that it was composed by Hionen Thsang in 648, and contains his own description of his extensive travels. The fourth work is that which is now for the first time translated. Of its authors, the first was Hoei-li a man distinguished for his talents and attainments, who was directed by the Emperor to translate Indian manuscripts under the guidance of Hiouen Thsang. In order to do honor to the latter's memory and to hand it down to posterity, he resolved (see pref. p. lxxvi.) to compile a separate narrative of the travels of his celebrated countryman, but he died before it was completed. After his death the manuscript of this work was lost, and on being discovered several years afterwards, Hiouen Thsang's former pupils requested Jen-thsong to arrange its scattered leaves and to write an introduction to it. Jen-thsong corrected the errors, and with the assistance of unedited documents filled up the gaps left by his predecessor; he also improved its style to which he imparted more perspicuity and elegance. The year of his death is unknown. The complete title of this work is 'Ta-thang-tsi-en-sse-san-thsang-fa-sse-tsh' ouen Hoei-li-pen-shi-jen-thsong-tsien, and signifies "the history of the Master of the law from the three collections in the Convent of Great Benevolence, composed by Hoei-li and Jen-thsong." The fifth journal of travels was composed by order of the Emperor about the year 730, and its title is: Ta-thang-khieon-fa-kao-seng tsh' ouen Thang-seng-i-tsing-tsionen i. e. "a description of the travelling routes of fifty-six pious men who, under the dynasty of the Thangs, explored western China in search of the law." The sixth and last work of this kind describes the journey of a single Chinese Bud-

dhist Khi-nie, who was sent to the Western countries at the head of three hundred Ġramanas and returned in 976. From his notes Fang-tshing-ta, under the same dynasty, composed an account of the travels of Khi-nie.

“Of the six works just mentioned that left behind by Hiouen Tshang himself is unquestionably of the greatest value, as well for the authenticity of its information as for the completeness of its details. Abel Rémusat and Klaproth acknowledge the great importance of this work, and the former announced his intention in a note, p. 77, of his “*Mélanges posthumes*,” to give the details of the travels of Hiouen Tshang in a collection which was to be published of travels of the Samanians in India. Paris possessed at that time but extracts, though very numerous ones from Hiouen Tshang’s works in the Pin-i-tien, or Accounts of foreign countries and people, and from these Landresse compiled and communicated in an appendix to Fokoucki, p. 377, a list of the countries mentioned by Hiouen Tshang with detailed notices of them and of their respective distances from each other. He further made an attempt to arrange them in the order in which they were visited, an attempt which could not be successful, because as already mentioned, the distinction between the countries which Hiouen Tshang had visited himself, and those which he described upon the reports of others, had escaped Landresse. The sources of the latter’s compilation must not however be overlooked, since they afford strong testimony in favour of Hiouen Tshang’s credibility.

“With all respect for Abel Rémusat’s acquirements, it may be doubted whether he was qualified to deal with the obstacles which a translator of the travels of Hiouen Tshang must encounter in his obscure style and in the frequent occurrence of Indian words—especially where he was unprovided with a sure method for the restoration of these words. Stanislas Julien as we have seen, discontinued his translation after having been in possession for sixteen years of a complete copy of the original work and latterly of two more copies received from China, and did not resume his task till he had hit on such a method. His introduction explains the process by which he made this discovery. It contains besides a review of Hiouen Tshang’s travels p. xl a defence of their au-

thenticity p. lxxviii. and some biographical accounts of the authors of the translated work p. lxxvi. Then follows p. lxxix. a sketch of the contents of his contemplated second volume, which as well as the subject of the authenticity of Hiouen Thsang, it will be time to notice hereafter. Stanislas Julien had first intended to print his translation of Hiouen Thsang's own manuscript, but he changed his mind on hearing of the existence at St. Petersburg of a copy of the work written after his death. He then resolved to translate and publish this work, because while giving a full account of the life of the learned and celebrated pilgrim, it is free from the numerous legends contained in his own work and is not so lengthy : for instance the description of Magadha alone occupies 108 pages in the Chinese original. The first five books of the translated work contain the history of Hiouen Thsang's youth and of his travels ; in the subsequent five are related the particulars of the later years of his life. Its conclusion contains, "*Les documents géographiques sur les pays 'mentionnés dans l'histoire de la vie et des voyages de Hiouen Thsang'*" p. 353. These are alphabetically arranged, and are, with few exceptions, taken from the Si-jü-ki.

"The work is of great value in two respects. It describes with great fidelity the condition of Buddhism during the first half of the seventh century in those countries visited by the traveller, and again it furnishes a tolerably complete topographical description of the latter at that time, and as regards India in still earlier times. Occasionally particular facts in the history of India are related. In regard to the first point, the mention made by Hiouen Thsang of the convents and religious edifices in the countries which he visited, if not very complete is of the most important character. Much information is given regarding the doctrines of the eighteen Buddhist sects of which little has been known hitherto but their names. The manuscripts most read in the different convents are pointed out, and we learn from this work a considerable number of titles of other works, not hitherto known, as well as many names of celebrated contemporary teachers. Finally in several instances the traveller adds to the existing stock of important events in the history of Buddhism ; thus he gives p. 95, an accurate account of the labours of the fourth Buddhist Synod.

“Not less valuable is the geographical intelligence communicated by him, and it is only by means of this translation that its full results will be appreciated. We are indebted to him for a nearly perfect list of Indian countries, as well as of those to the west and north-west, and for accounts of their distances from each other and of the directions of the roads leading to them. Though, as already observed, Hiouen Thsang remarked only what appeared important to him as a Buddhist, we are able with his assistance to give an outline map of India, of part of Balukistan, Kabulistan, Western and Eastern Turkistan, and on this nearly all the countries named by him could be entered. Of these several are first mentioned by Hiouen Thsang and have not been yet found in other works. I should remark here that he seldom specifies the capitals of countries, usually designating the latter after their capitals though not always correctly, for instance Mathura, p. 421, which is the name of a well known town in India. In consulting the geographical details of Hiouen Thsang, it must be remembered that he had no intention of supplying a political geography for the countries of which he speaks, but only here and there names their kings or mentions the extent of their power. It would therefore be a mistake to consider all the countries mentioned by him as independent sovereignties. That I am justified in taking this view is clear from the fact that Çilâditya bestowed the revenues of eight great towns of Odra or Orissa on a celebrated teacher, Gagasena, p. 213, and according to p. 244, the latter could issue orders to eighteen kings, who must therefore have been subject to him. Considering that we know of no contemporary author, who has in any language given a satisfactory account of the geography of those countries in Asia visited by Hiouen Thsang, his communications on this subject cannot but be pronounced most valuable. The distances between the several countries stated by him will generally stand the test, provided no unreasonable demands are made: in one instance only when describing the countries near Guzerat they are considerably too great, and the direction of the roads is incorrectly given as St. Julien (pref. p. lxiv.) has remarked. These mistakes, however, can be corrected by means of such names of places as are admitted and as can be ascertained from other sources, and need not shake the general feeling of confidence in the other geographical notices of Hiouen Thsang.

The complete translation of these will alone throw full light on the character of his contributions, which even in the abbreviated form in which they have hitherto been consulted, have served to elucidate many points in the geography of ancient India.

“It is not therefore easy to conceive how Major Anderson has ventured to assert (“An attempt to identify some of the places mentioned in the itinerary of Hiouen Thsang,” in *Journal of the Asiatic Society of Bengal* Vol. XVI. p. 1186,) on the strength of his readings of some geographical names mentioned by Hiouen Thsang and taken from Arabic and Persian geographical works, that his work was based on these latter, particularly on that of Edrisi, and that it would not be older than one hundred years. He considers the itinerary to be the fabrication of a modern writer who, following the example of Barthélemy, undertook to describe the travels of a fictitious Hiouen Thsang as those of a young Chinese Anacharsis, and to introduce into his narrative the wanderings of different Lamas in the several parts of Asia in which Buddhism had flourished. St. J. very justly (pref. p. lxviii.) thinks it superfluous to refute seriously this preposterous hypothesis, but he is right in defending Hiouen Thsang against the somewhat rash conclusion drawn by Wilson (*Lecture on the present state of Oriental Literature* in *Journal of the Royal Asiatic Society* Vol. XIII. p. 213) from an extract from the *Si-ju-ki* translated by St. Julien. This extract Wilson says, does not inspire much confidence in the authenticity of Hiouen Thsang’s travels, which have rather a legendary, if not a fabulous character. Against this position St. Julien urges that Hiouen Thsang composed his work by order of the Emperor in the year 648, and that so early as 669, it was analysed in all its details in the great *Encyclopædia Fa-juen-tshu-lin*; further that the legends form but a small part of Hiouen Thsang’s work, which contains besides many notices on the religion, the customs and the commerce, &c. of India, and that as a pious Buddhist he had only recited the legends, exactly as he had received them from others. It may be added, that all who have occupied themselves with the religious and political history of India, are well aware that legends must occasionally supply the want of historical accounts and that handled with the necessary discretion, they contribute to our knowledge of history. The imaginative mind of India has produced numerous legends which form

perhaps its most peculiar creations, so much so that its religious history cannot be rightly understood without a knowledge of the legends.

“After this representation of the chief contents and merits of the work, I feel certain that all my colleagues will agree with me that it will greatly promote researches in Buddhism, as well as in the geography of India and of its adjacent countries in the west and north-west, two branches of oriental archæology to which it contributes the most important information. With regard to India, it supplies in many cases indigenous sources. St. J. has thus added another to his already numerous and important productions in the department of Chinese literature, one which will be of immense advantage to the students of Indian antiquities, and for which he will always be entitled to their gratitude. It has been the means of showing what fruitful results are derivable from continued enquiries in the rich field of Chinese Buddhistic literature. All orientalists therefore must devoutly hope that St. J. will be in a condition to bring out a second volume, which according to the pref. p. lxxix. is destined to contain the following additions. First a translation of all extant accounts of Chinese pilgrims in India, of which two, namely, that of Fa-hian, the other of Song-jung (the latter in C. F. Neumann’s *Pilgrimages of Buddhist priests from China to India*) have already been translated, though not quite with the accuracy to be wished. We shall thus command the means of extending our acquaintance with India through Chinese sources. St. J. proposes also to give a complete analysis of all the most important facts of the Si-jü-ki, which is to be preceded by a complete translation of Hiouen Thsang’s description of Magadha. It would enhance the value of this analysis very much, if the legends were only given in abstract and the historical facts in full. Not less useful will be the compilation of Chinese accounts from the writings and biographies of celebrated persons mentioned in the translated work. These bibliographical and biographical notices are to be followed by a chapter on chronology, which will be taken from the great work *Fo-tou-tong-ki* compiled in the 11th century. To these will be added biographies of the six and twenty Patriarchs. These were not, it is true, regarded by the Chinese as the supreme heads of Buddhism in India, and their biographies teem with legends possessing no chronological value, but the latter still contribute many useful materials to the history of

Buddhism in India. Two indexes will close the work, one a Chinese Sanskrit and the other a Sanskrit Chinese index, together with a list of French words requiring explanation and two very old Chinese maps with another compiled for the work by the well known Vivien de Saint Martin.”

C. LASSEN.

Mohl's notice of the translation glances only at some of the points remarked on freely by Lassen, but he is puzzled why M. Julien should have preferred translating the biography before Hiouen Thsang's own narrative: “On se serait attendu à ce qu'il eût choisi la première (la réduction du voyageur même) et se fût servi de la seconde comme supplément et pour en tirer des éclaircissements, car il s'agissait d'un document historique de la plus grande importance, qu'on devait désirer posséder dans sa forme la plus ancienne et la plus authentique. M. Julien choisit comme texte à traduire la biographie, en réservant la relation du voyageur même pour les éclaircissements et les suppléments. Les raisons qui l'auront déterminé à cette déviation de la marche que la nature des choses paraissait prescrire, doivent être très-fortes; mais je regrette qu'il n'ait pas cru devoir les indiquer.”

He proceeds however—

“Chaque nom d'homme ou de livre dans l'Inde, qui acquiert une date fixe, est un jalon de plus pour l'histoire de ce pays, et l'on comprend aisément de quelle importance est le travail ingénieux de M. Julien, qui nous permet de les retrouver. Dans tous les cas où l'auteur chinois indique le son et le sens d'un mot sanscrit, on peut être à peu près sûr de la restitution de M. Julien; quand l'auteur n'indique que le son, les règles de transcription que M. Julien a trouvées déterminent encore presque avec certitude le mot sanscrit; mais quand il n'indique que le sens, il peut rester des doutes sur les noms formés par le traducteur d'après cette donnée nécessairement un peu vague. Mais ce qui est positivement acquis à l'histoire est un gain énorme, et des renseignements venus d'autres côtés contribueront probablement à mettre hors de contestation les points qui aujourd'hui ne peuvent pas encore être fixés avec certitude, et que M. Julien a eu soin de marquer lui-même.”

The notice terminates with an expression of regret that M. Julien should have spoken in a disparaging tone of Rémusat, “restaurateur des lettres chinoises en Europe.”

Weber while giving Julien's work a warm welcome avows his disappointment at the non-publication of a literal translation of the original narrative of Hionen Thsang. He notices also the vague tone in which the intention to publish so great a desideratum is announced by Julien, 'sans renoncer toutefois à publier plus tard le livre même de Hionen Thsang.' The translation of this biography does not, in his opinion, add much information of importance to what has been furnished by the Editors of the *Foe-koue-ki* and by the detached translations from the text of Hionen-Thsang already contributed by Julien, and published by Reinand and Lassen.

As regards the process of restoring Sanskrit words for which Lassen has given such credit to Julien, and the results of which were published in the *Journal Asiatique** in 1849, Weber points out a serious omission which deprives the Chinese-Sanskrit Concordance of much of its value. The latter contains merely the Chinese titles and the Sanskrit titles as restored by Julien, and not the phonetic transcriptions, from which these last were restored, an omission which debars others from judging for themselves on the accuracy of the restorations : for instance—

"No. 47, Changtso-pou-tsang of the Concordance is shown as Sarvâstivâ-davinaya. No. 119, Chone-i-tsie-yeou-pou-pî-naï-ye-tsang is also shown as Sarvâstivâ-davinaya. But in enumerating the books brought to China by Hiouen Thsang in the 6th book of this biography, the author has mentioned the sacred books, or memoirs on the discipline and philosophical treatises of the school Chang-tso-pon as distinct from others of the same character of the school Chone-i-tsie-yeon-pou. Only one of these schools therefore can really be sarvâstivâda. Perfect reliance cannot be placed on the restoration from the Chinese of the Sanskrit titles of Buddhist works till after due collation of Chinese with Tibetan titles which last are generally found accompanied by the Sanskrit title. According to the Russian Father Habakuk it would seem that in a Pekin edition of the *Kagyar*, which has not yet reached Europe, much of the materials for such a collation already exists."

Weber also notices the terms in which Julien has spoken of Rémusat. He concludes by earnestly entreating the latter to lose no time in bringing out his translation of Hiouen Thsang's original work.

* See title of article quoted above by Lassen.

Literary Intelligence.

The *Journal Asiatique* for December 1852, completing its fourth series and 20 vols. contains an interesting letter to M. Mohl by M. Place, on an expedition made by the latter to Arbela from Khorsabad where he is following up the discoveries of Botta. The 2nd paper is by Cherbonneau and is entitled “*Documens inédits sur l’hérétique Abou-Yezid-Mokhalled-Ibn-Kidad de Tademket*,” translated from Ibn Hammad’s Chronicle. There is an interesting letter by de Hammer-Purgstall giving the titles of 30 Arab works on horses.

The January No. has an extract from the Romance of Antariq by G. Dugat. The subject is historical, and has been treated at length by Caussin de Perceval. The paper is entitled ‘*Ses jours du bien et Ses jours de mal du Roi Nomán*.’ The rest of the No. is occupied by the conclusion of Du Caurroy’s notice of the Musalmán Civil Code ‘*rite hanéfi*.’ In the February and March No. Rousseau prosecutes his translation of Et Tidjani, a traveller in Tunis and Tripoli, and de Meynard commences that of the 4th Part of Thâlebi’s *Yétimet ed-Dehr*, which describes the writers of Transoxiana, Khorasan and particularly of Nissapur under the dynasty of the Samanides and under the first Guznevide Sultans. The first part of this work was published at Leipzig in 1847, by Dietériçi. Amari contributes an article on an old MS. in the Bodleian library, containing the replies of a Spanish philosopher Ibn Sab’in to questions put to him by Frederic II. of Sicily.

In No. 3 Rousseau’s translation is completed, Dugat gives a paper entitled *Etudes sur le Traité de Médecine d’Abou Djafar Ahmad (Zad al Moçafar)* and Defrémery writes on the reign of the Seldjouk Sultan Barkiarok 485—498 A. H. from which the power of that family dates the commencement of its decline. The translation of an extract from a work by Ibn Elkouthyia by Cherbonneau closes the No.

The June and July Nos. are mostly occupied by correspondence, which comprises a long and interesting letter from M. Fresnel at Hillah. Sanguinetti gives the text and translation of a satirical fragment of which the MS. is in the Leyden library. It contains a

spirited criticism in verse of the principal Arab tribes by different ancient poets.

Mohl's Annual Report published in the August No. of the *Journal Asiatique* announces the intended publication by the Paris Asiatic Society of a new series of works called the 'Collection des auteurs Orientaux.' The first work of the series is the *Travels of Ibn Batutah*. The text is to be accompanied by a translation by Defrémery and Sanguinetti, and will occupy 4 vols., of which the first will by this time have been published. The second work which is in the press is Masoudi's 'Prairies d'or,' and the third will be Ibn Hisham's biography of Muhammad. The work is to be brought out in an inexpensive form.

The Report reviews the labours of the West and of the East so far as they are known in Europe, in the field of oriental literature during the last two years. A summary, which can scarcely be more than an enumeration of the works reviewed, will give information of interest to many of the distant readers of this journal.

"Hammer's *Histoire de la littérature Arabe* is already in our Library. The same author has since published three memoirs on Muhammadan mythology and demonology, on the origin and composition of Arab names, and on the form and manufacture of bows and arrows as used by the Arabs and Turks. Reinaud and Derenbourg's new edition of '*Les Séances de Hariri*' is accompanied by an Arab commentary chosen by Silvestre de Sacy and by a detailed notice of Hariri which the discovery, in the *Bibliothèque Impériale*, of new and authentic documents has enabled the editors to compile. 'Ibn al Athiri Chronicon' is the title of a work published at Upsal by M. Tornberg, consisting of the 11th vol. of the *Chronicle of Ibn al Athir*, one of the principal sources from which later authors have drawn their information. This volume comprizes the period between 527 and 583 A. H., but it is unaccompanied by either preface or translation.

"At Leyden has appeared the text of the *Travels of Ibn Djobeir* an Arab of Spain who wrote in the 12th century of our era. It is edited by Mr. Wright who has promised shortly to publish a translation. That of another work of the same character, being the travels of Scheikh al Tidjani in Tunis and Tripoli, by M. Alphonse Rousseau, has, as above stated, been published in the *Journal*

Asiatique. M. Cherbonneau's translation of that part of Ibn Batutah's Travels which relates to Northern Africa and Egypt, is a further contribution to this department of literature.

"The 1st volume of de Slane's translation of Ibn Khaldoun's History of the Berbers has been published—the text, it will be remembered, was brought out some years ago by the same editor. An introduction gives an analysis of the entire work, a genealogical list of the Maghrebin Arab dynasties, the life of Ibn Khaldoun, and an alphabetical table of geographical names, while an Appendix contains extracts relative to the Arab conquest of Africa from a history of Egypt by 'Abderrahman ibn' Abd el Hakim and from the great work of Noweiri. The Abbé Bargès has translated another Arabic work on the Berbers called History of the Beni Zeian, kings of Teemcen, a Berber family, which rose to importance on the ruins of the Western Caliphate, and maintained their position from the 13th to the 16th centuries of our era.

"Sprenger's Life of Muhammad is then noticed as adding many new facts to what was previously known of the prophet's life, together with another work entitled, Life and religion of Muhammad as contained in the Sheeah tradition of the Hyat al koloub. The author, Mr. Merrick, is an American Missionary, who lived for some years in Persia, and whose object was to give a faithful exposition of the Sheeah traditions according to the Hadits acknowledged by that sect. Muhammad Baber, the author of the Hyat al koloub was one of the most esteemed of Sheeah writers, and died in 1697.

"Dr. Juynboll of Leyden, besides continuing his Lexicon Geographicum, has commenced an edition of Abou Mahasen's Annals of Egypt. This author resided at Cairo in the 15th century and was the disciple and rival of Makrisi. The text will occupy 12 vols. and is to be accompanied by a translation. Dozy too has added another volume to his materials for a future history of the Arabs in Spain, containing extracts from the several Arab authors who have written on the Abbadian dynasty. Another work by the same author, giving portions of two Chronicles on the subject of the Arabs of Spain and Africa, opens with a valuable introduction which criticises the Arab Spanish historians, exposing their defects and indicating such of the works as it is of importance to recover.

“Kosegarten’s 3rd vol. of Tabari is composed entirely of anecdotes connected with the battle of Kadesia, which left Persia at the mercy of the Arabs.

“The philosophy of the Arabs has been illustrated by works by Haarbrücher of Halle, Renan and Poper, the first of whom has completed the translation of a work on the religions and sects of Scharistani. Perron has completed his *Précis de jurisprudence Musalmâne*, a translation from Khalil Ibn Ishak a jurisconsult of great authority. To this department belong also Baillie’s works on the law of sale and the land-tax, and Morley’s Digest which are accordingly here noticed. Flügel’s *Bibliographic Dictionary of Hadji ’khalifa* is completed all but the appendix: it now consists of 6 vols. published at the expence of the London Translation Fund.

“Freytag has completed an edition of the text and translation of Abou Temam’s *Hamasa*, the only extant anthology of five similar collections made by Abou Temam, a poet of the 3rd century A. H. while snowed up at Hamadan. This was the most brilliant period in Arab literature, when Greek and Indian science was studied for mental culture, while the old desert poetry which expressed the national sentiments in the purest and most idiomatic style, directed the taste and preserved the language. Many of the poems in this collection were composed before and during the time of Muhammad. Another work now completed by Freytag is an edition of the *Fakihet el Kholafa* by Ibn Arabschah, an author of our 15th century better known by his life of Timour. The text of this was published some time back and to this has been added a small vol. of notes, which were very necessary. The *Solwan or Waters of Comfort* of Ibn Zafer, a Sicilian Arab of the 12th century, has been translated and published by Amari in London. The work is a collection of anecdotes and fables, and its object is to exhort the reader to the exercise of virtue. Of the same character is another work entitled *Turkish Evening Entertainments*, translated by Mr. Brown of the American Legation at Constantinople, from a Turkish author of the 17th century.

“Dietériçi’s translation of Ibn Akil’s *Commentary on the Grammar of Ibn Malik* will be welcomed by all who study the philosophy of languages—as will also the *Adjroumieh*, a text and translation of

which has been published at Cambridge, this being in general use in oriental schools. A treatise of Alkarkhi an Arab mathematician of our 11th century which has just been brought out by Wôepcke will supply a gap in the history of mathematics and fix the true position of the Arabs between the Greeks and the Italians, a position which has given rise to much discussion.

“The review of what has been done by France and England respectively in Turkish Arabia is very short, but a contrast drawn between the style of publication adopted in the two countries, announces the fact that neither Rawlinson nor Layard possesses a copy of Botta’s expensive work.

Westergaard’s edition of the Zend-Avesta of which the first vol. is published will contain the text of the Zoroastrian sacred books with variants from all the MSS. accessible in Europe, together with a translation and a history of Persia prior to the Arab conquest. A Dictionary and Grammar of the Zend language will be added. The same author has published the facsimile of a Pehlevi MS. called the Bundehesch. Spiegel’s text and translation of the Avesta are appearing in two separate works, the first vol. of the latter containing a very able essay on the religious history of Persia. The principle which he has observed in interpreting the texts is to follow as closely as possible the Persian tradition such as it is given in the Pehlevi and Pazend translations, leaving for prosecution hereafter the task of discovering the ancient meaning of these works by the means furnished by a study of the Vedas and by Comparative Grammar. It is only thus that the true sense of much of the Zend Avesta can be obtained, and indeed on some points we are already better informed than were the translators of Sassanian times. The study of Zend in Germany has made such progress that Lassen has just brought out a class book for use in the universities.

“Bopp, having published the 6th and last vol. of his Comparative Grammar, is now engaged in revising the first parts of this work.

“Johnson’s new edition of Richardson’s Persian Dictionary which has been brought out at the expense of the East India Company, contains 30,000 words more than the previous edition of 1829. The true merit of this edition consists in the greater care with which Johnson has examined the original Persian Dictionaries which form

the base of the work. But really useful as this compilation is, it can never be what a Thesaurus is. On such a work Quatremère has now been engaged for forty years, and its publication is anxiously looked forward to.

“Chodzko’s Persian Grammar or ‘Principes de l’ Iranien moderne will be most useful, not only to such as desire to study the language now actually spoken in Persia, but to philologists. The same author has commenced the publication of a collection of Taziehs under the title of ‘Repertoire du théâtre Persan,’—His MS. is from the library of Futteh Ali Shah and contains 32 dramas. A translation of the whole collection will follow.

“The Bostan of Sadi and the Fragments of Ibn Iemin have been translated into German verse by Schlechta at Vienna, and de Schach at Berlin has similarly translated some of the Episodes of Ferdousi’s Shahnámeh. Bland’s century of Persian Ghazals introduces ten poets, whose works have not yet been published in Europe. The history of Persian poetry on which this author has now for some time been employed, and for which he has collected a magnificent supply of MSS., is anxiously looked for. Another translation has been made of the Gulistan by Eastwick, and a punctuated edition of the text with the necessary vowel marks has been published by Dr. Sprenger. Col. Ouseley moreover has brought out a good edition of the text of the Anvari Soheilee, which was much wanted in Europe.

“New editions of Ferdousi, Hafiz and other works from the lithographic presses of Teheran and Tabriz have reached Europe, and the Dabistan has been republished at Bombay.

“In Sanskrit the study of Vedic literature engrosses every year more attention. Langlois has completed his translation of the Rig Veda. Roth and Whitney are engaged in editing the Atharva and Weber is continuing to publish the White Yadjur. Röer will soon be commencing with the Black Yadjur and still prosecutes his task of publishing in the Bibliotheca Indica a complete series of the Upanishads. Weber’s Essay on Indian literature, which is devoted mainly to the Vedic period, is a most interesting discussion of subjects, which thirty years ago few had the opportunity of making themselves acquainted with. Barthélemy St. Hilaire’s Memoir on

the Sankhya philosophy examines at great length the system of Kapila, and attributes to his school the philosophical doctrines of Sakhyamunee.

“ Gorresio at Paris has published the 2nd vol. of his Italian translation of the Ramayana, and Parisot the first vol. of his French translation, the text followed by both being that of the work current in Bengal. Pavie has translated the 10th book of the Bhagvat Purana. The means of studying Sanskrit have been facilitated by Ballantyne's text and translation of the Laghou Kaumudi of Varadaraj, the Grammar principally used in the Bráhmancial schools and by Benfey's Grammar. William's English and Sanskrit Dictionary, a 3rd edition of Wilson's Dictionary now under preparation, and a Sanskrit Thesaurus about to be published at St. Petersburg by Bôthlingk and Roth, are all works indicative of the progress which is being made in establishing the true relations of European languages with the Sanskrit. Holmboe, moreover, has published an excellent grammatical and lexicographical comparison of Scandinavian dialects with the Sanskrit, and Delatre has commenced on a similar comparison of the French language.

“ Lassen's Antiquities of India, of which the 2nd vol. is now complete, is an instance of what European criticism can construct from the most heterogeneous elements. The political history of India must always be very incomplete, but it is probable that its moral and social history will one day be better known than that of any people of high antiquity, and the value of this attempt of Mr. Lassen's cannot be too highly estimated.

“ In Buddhist literature Burnouf's *Lotus de la bonne loi* is a translation from the Sanskrit, and is accompanied by a commentary and by 21 tracts on Buddhism. The same author has left a vast quantity of materials for his History of the Buddhism of the South, on which he was engaged when he died, and it is hoped that much of it will yet be published. Spence Hardy's works are the result of a twenty years' residence in Ceylon, where the author collected a large library of MSS. bearing on Buddhism. Latter has published Selections from the vernacular Buddhist literature of Burmah, and Bennet, an American Missionary has translated the life of Gaudama from the same language. But St. Julien's biography of Hiouen Thsang is

perhaps the most interesting contribution to this department of literature.

“Bazin has collected together his articles in the *Journal Asiatique* on the learned and popular literature of the Chinese under the Mogul dynasty, and Dr. Medhurst has published the Anglo-Chinese portion of his Dictionary which is compiled principally from the Kang-hi, and will be invaluable to Europeans in China.”

To return to our notice of the continental periodicals. No. 4 of the *Zeitschrift* of the German Oriental Society opens with a paper by Dr. Oslander on the Pre-Mohammedan religion of the Arabs, a subject which he observes has never yet been thoroughly examined. Caussin de Perceval and Dettinger have added something to the information collected by Pocock, but to enquire into the old Arab religion was not a part of the plan of either. The writer's object here is, to explain the seat and limits of each particular worship which prevailed in Pagan Arabia, as well as its character and meaning. Haug continues his paper on Zend researches and Hammer his extracts from Saalchi. Stenzler has a paper on Paraskarás Grihya Sûtra, a work which he describes as forming a supplement to Katyáyana's Çrautâ-sûtra, and of the contents of which he gives an abstract.

No. I. of the same Journal for 1854, is taken up entirely by an elaborate paper on Coins with Pehlevi Legends by Dr. Mordtmann. It is accompanied by ten Plates which give the alphabet and the readings of the figures and of the mints. Among the reviews is an interesting notice of Böhtlingk's Grammar and Dictionary of the Jakute language.

The 1st No. of the *Indische Studien* for 1853 contains an alphabetical list of the openings of the several verses in the Rik Sanhita. The list had been commenced by Professor Roth, by whom it was made over to Mr. Whitney, the labours of both being prosecuted to a termination by Pertsch. The only other paper is by the editor and is entitled ‘Recent Researches in the field of Buddhism.’ It is a review of Spence Hardy's, Burnouf's, and Julien's publications and his remarks on this last work will be found in substance elsewhere.



Horn of the Shou Ruyge

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR FEBRUARY, 1854.

At a meeting of the Society, held on Wednesday the 1st instant, at the usual hour,

SIR JAMES COLVILE, Kt. President, in the Chair.

Presentations were received—

1. From Capt. W. S. Sherwill through Capt. Thuillier, four coins from Sikkim.

2. From Capt. H. L. Thuillier, Deputy Surveyor General, Revenue Survey Maps of the following districts:

Bhuteanah—Seebpoor, Upper Assam—Purneah—Tirhoot and Chittagong.

3. From Mr. Thompson, a Burmese Dagger.

4. From J. A. Cockburn, Esq. Superintendent of the Barrackpore Park, Carcase of a Nil Gai, *Damalis Risia*.

5. From the Government of Bengal through W. J. Young, Esq. Under-Secretary, for the Museum of Economic Geology, a Map of the Chittagong district.

6. From the Academy of Sciences of Bordeaux through Mons. P. F. Guestier, a member of the Academy, Acts of the Academy for the year 1852.

7. From the Imperial Academy of Vienna, Proceedings of the Academy, Vol. X. parts 4, 5.

8. From Dr. Campbell, Darjeeling, a skin and a tracing of the horns of the "Shou Rubge" of Thibet.

"The horn" says Dr. C. "is now in my possession and said to be of the ordinary size. This deer is described as being a good deal

smaller than the large "Shou" (see Journal Asiatic Society for 1850) and larger than the spotted deer of India, to be of the same colour as the Shou, and to inhabit the same localities, viz.: the upper portion of the Choomtee valley where open glades and trees abound.

"N. B. 'Shou' is the generic term for Deer in the Thibet language. This species is Shou Rubge or the eight-antlered deer. The larger animal is Shou Kupelroo 'or the ten-antlered deer.' "

The following gentlemen, duly proposed and seconded at the December meeting, were balloted for, and elected ordinary members :

Bábu Nagendranáth Tagore.

G. H. Freeling, Esq. B. C. S.

The following were named for ballot at the next meeting.

Major M. L. Loftie, proposed by Dr. Sprenger and seconded by C. Allen, Esq.

Lt. Hitchens, Bengal Engineers, proposed by Mr. B. H. Hodgson, and seconded by the President.

C. Chapman, Esq. B. C. S., proposed by Mr. Grote, and seconded by Dr. Sprenger.

The Council submitted a report stating that they have appointed the following sub-Committees under By-Law 80.

Sub-Committee of Finance.

C. Allen, Esq. and Major W. E. Baker.

Sub-Committee of Oriental Philology.

Dr. Röer, Principal W. Kay, Rev. J. Long, Professor F. E. Hall and Lt. W. N. Lees.

Sub-Committee of Natural History.

Dr. G. G. Spilsbury, Dr. H. Walker, Dr. H. Falconer, Dr. A. C. Macrae, and Major W. E. Baker.

Sub-Committee of Library and Journal.

Capt. H. L. Thuillier, Dr. H. Walker, H. Woodrow, Esq. and Rev. W. Kay.

The President in a short speech announced to the meeting the death of Sir H. Elliot and then proposed the following resolution.

That the Society desires to record its deep sense of the loss it has sustained by the untimely death of Sir Henry Miers Elliot, K. C. B. a man not more eminent for the civil services which had earned

such general recognition and high reward than for the variety of his knowledge and for the zeal and ability with which, amidst the distracting cares of official life, he pursued his researches in the field of Oriental literature.

Mr. Grote seconded the resolution, which was carried unanimously.

Mr. Houstoun gave notice of a motion for the next meeting of the Society, to know under what decision of the members assembled in General Meeting, letter No. 217 of the 3rd December, 1853, was written and made to appear as if the act and deed of the Society.

Communications were received—

1. From E. C. Bayley, Esq. C. S. enclosing a note on the Khunniara Inscriptions.

2. From W. G. Young, Esq., Under-Secretary to Government of Bengal, stating with reference to a communication from the Society under date the 3rd inst. that His Honor the Deputy Governor of Bengal has been pleased to sanction an annual grant of Rupees 140 for keeping the ruins of Gour and Puruah free from jungle, and that the conservancy of the ruins has been placed under the Joint Magistrate of Maldah.

3. From H. Cooper, Esq. Officiating Under-Secretary to Government of India, forwarding transcripts of inscriptions copied at Sanchi, in 1850-51, by Lt. Maisey, with a view to their translation.

4. From Dadoba Pandurang, Esq. Ahmednagar, enclosing a list of Mahratta books for sale at the Elphinstone Institution.

5. From W. G. Young, Esq. Under-Secretary to Government of Bengal, communicating a Memorandum on the Coal stated to occur in the Sivok Nuddee near the river Teesta, by Professor T. Oldham, Superintendent of the Geological Survey of India.

The following is the substance of the Memo.

“Arriving at the Sivok Nuddee I devoted some days to the careful examination of the district adjoining, but was not able to discover the smallest trace of the existence of any bed or regular deposit of coal. Coal may undoubtedly be found in the rocks and in the detritus of the stream bed, but it only occurs as the carbonized bark of stems of trees of various sizes, imbedded in the thick formation of pebbly sand-stones which occur here. On these stems the

carbonized bark is sometimes tolerably thick, varying from one inch to 1½ inch, occasionally very thin, and often absent altogether.

“The central portion of these stems is invariably composed of hard sandy layers, of which the fissures and divisional planes are coated with carbonate of lime.

“These stems are frequently much worn and rounded, and have evidently been carried for some distance, and deprived entirely of their bark and external covering before being imbedded. In other cases there is nothing save the position of the stems in the rocks, to shew that they have not been imbedded where they grew.

“I did not find a single instance of an upright stem; all are on the planes of bedding of the rock or but slightly divergent from these.

“These stems vary much in size, being from a few inches to ten and even fifteen feet, of which length I measured one. Of this, the thickness in the centre was seven inches, and its breadth one foot three inches, being considerably flattened. One portion of this large stem, was altogether without any carbonized or coaly integument, while in other parts this coaly envelop was more than one inch in thickness. The series of rocks in which these stems occur is of very considerable thickness and consists of a number of alternating beds of coarse cherty shales, and thick masses of grey, and brownish sand-stones, generally highly micaceous. There are but slight traces of calcareous matter throughout, lime occurring only in earthy calcareous nodules, in a few of the shaly beds. The whole group is not less than 4000 feet in thickness, and throughout dips at considerable angles to the north, and north-west, never less than twenty degrees, but generally ranging from forty-five to sixty.

“Through the greater portion of this extensive series, but invariably in the coarser, and more pebbly sand-stones of the group, occur the stems which we have noticed, and in the formation extending along the base of the hills into the Bhotan territory, these stems are found in the same rocks, occurring along the bed of the Teesta as well as along the bed of its tributary the Sivok; and no doubt, continue to the eastward also; indeed they appear slightly more abundant and larger in the Teesta, than in the Sivok.*

* Sivok, and Chawa or Chiwo, the two names by which this Nuddee has been

“The peculiar structure and aspect of pieces of this coal, referred to by Mr. Piddington in his report, are due solely to the original structure of the barks of the stems still preserved in their present mineralized condition. In one of the beds of finer shale near the base of the formation, I found numerous impressions of leaves of trees and small fragments of carbonized stems, which will be subjected to further examination, but no other fossils whatever were observed. The characters of these leaves at once point out the geologically recent epoch of the rocks in which they occur. There is no trace of the great nummilitic group so largely developed along the base of the Himalayan range, both the East and West, and taking this into consideration along with the very recent aspect of the few vegetable remains which have been found, I am disposed to refer the entire of this great thickness of rocks, to the more recent periods of the Tertiary epoch.

“There is not the slightest prospect of this locality proving in any way useful as a source of coal for any commercial purposes. Much of the sand-stone would make a good dry building stone, easily convertible, and, for interior work or wherever protected, durable.”

6. From W. J. Hamilton, Esq. Secretary Geological Society, London, acknowledging receipt of the Journal Nos. 232 to 235 and Catalogue of Birds.

7. From Dr. R. Anger, Librarian, German Oriental Society, acknowledging receipt of the Journal Nos. 232 to 235.

8. From J. Barlow, Esq. Secretary Royal Institution, London, acknowledging receipt of the Journal Nos. 232 to 235.

9. From Major J. Abbott, enclosing the following papers—

1. On the Popular Ballads of the Punjab.
2. Gradus ad Aornon.
3. On the Mirage of India.

10. From the Government of Bengal through Mr. Under Secretary Young, enclosing a Memo. of observations made by T. Braddell,

designated, are only the different modes of pronouncing the same name by the Lepchas (Sivok) and the Michis (Chewa or Chewah). The latter people in most cases give the harder sound of ch to the same words, which the hill tribes pronounce with an S. Thus a large hill near the source of this Nuddee is Sitong, among the Lepchas and Chitong among the Michis, &c. &c.

Esq., Assistant Resident, Malacca, during a journey to Mount Ophir Gold Field, and the River Moor, together with a note on the same by Professor Oldham.

11. From H. Piddington, Esq., Curator Museum of Economic Geology, submitting a paper for the Journal on the quantity of Silt held in suspension by the waters of the Hooghly at Calcutta in each month of the year.

The Librarian and Curator submitted their usual monthly reports.

Report of the Curator, Museum of Economic Geology.

Geological.—Forwarding, now some two or three years ago, some specimens sent down by my friend Major Jenkins for that purpose to a relative of his, the Very Rev. Canon Rogers of Exeter Cathedral, I took occasion to request of that gentleman the favour of any specimens with which he could oblige us, sending him at the same time one of the circulars of the Museum of Economic Geology; and he has in return* sent us two small boxes containing 25 fine specimens of ores and rocks, almost all of which will be additions to our cabinets. The catalogue is annexed.

I have received from the Government of Bengal, the accompanying report on the gold country about Mount Ophir at Malacca, with Professor Oldham's remarks on it, but I have not yet received the specimens which Professor Oldham was to send to us. I suggest that these reports will make a good paper for the journal.

Museum of Economic Geology.—Major Baker has procured for us through Colonel Napier two fine specimens of the iron ores of Korana described in my Report Journal No. 2 of 1853, one of which is the Isomorphic Carbonate of iron therein described, in its rock of milk quartz, and the other explains a word in Mr. Purdon's report, which I forbore at the time to remark upon, thinking that it must have been an oversight. It will be seen page 208 that that gentleman calls the iron ore of Korana a Hæmatite, while my analysis proves it to be a carbonate; but the second specimen of the two now sent shews that we are both right; for this last specimen is a fine Hæmatite and would probably furnish a first rate quality of iron if properly smelted. There is also a specimen of the rock of the Korana hill which is a schistose hornblende sandstone upon a hard grey sandstone rock.

I have in hand a large collection of 70 specimens from Captain Haughton from the S. W. frontier, but these being but partially examined and

* The boxes seem to have been delayed at the India House for a long time.

some of them requiring much care, I defer any account of them for the present.

I have put into a paper for the journal my account of the new mineral NEPAULITE of which beautiful specimens are on the table. This paper will be followed by one or two more describing the other products which this donation from His Excellency General Jung Bahadoor, and Major Ramsay's zealous attention to my frequent, and I fear troublesome requests, will enable us to add to the science of Mineralogy in India.

Report of the Curator of the Museum of Economic Geology for January, 1854.

(Read at the February Meeting.)

Geological.—I have put into the form of a paper for the journal the curious results which I have obtained from an examination of the water of the Hooghly taken at Noon on the first of every month in the year, which are of great scientific interest in many points of view, and will eventually become so economically, I have no doubt. I refer to the paper for details which cannot be conveniently abridged here.

Captain Bowen of the P. and O. S. Str. Bengal has obliged me with the following note of a tract of white milky sea passed through by him on his recent voyage from Aden to Ceylon.

Monday 16th January, 1854.

At 7 P. M. ship entered into a perfectly white milky sea, cloudy on the horizon but perfectly clear; bright star-light; moon half an hour from rising.

Stopped and tried for soundings 90 fathoms. No bottom.

Density of the water before entering that strange appearance 11°. Density of the water when sounding 14°.

Sympiesometer,	29°	90'
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Barometer,	30	12
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Thermometer,	80	0
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Latitude 11° 59' N. Longitude,	59	2 E.
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I may remark that previous to entering this strange sea, there was a moderate ripple on the water and after leaving it also, but smooth, like oil when in it.

(Signed) JOHN BOWEN,

S. S. Bengal from Aden to Ceylon.

In his letter Captain Bowen says: "I once saw the like on the Malabar coast fourteen or fifteen years ago, but not at all to the extent this was; for the horizon (on this occasion) was in the same state as the water along side."

I have once before recorded (Proceedings for March, 1847, Journal Vol. XVI. p. 382), an instance in which this milky luminous appearance was seen off the Cape of Good Hope, and Dr. Buist in the transactions of the Bombay Geographical Society has also recorded an instance in which a Company's Steamer from Bombay to Aden passed through a large extent of it; and it is I think mentioned also in Horsburgh and some modern books of voyages? but we are so ignorant to what it can be owing, that every accurate notice of it is worth registering. If we could obtain some bottles of the water, carefully put up and corked, we might perhaps, between chemical testing and the microscope, arrive at some results worth knowing; unless the appearance be a purely electrical phenomenon?

Mineralogical.—We have received from Rev. Mr. Phillips a specimen of Sulphate of Barytes from Landour and of saccharine Gypsum from Mussoorie, both of which from their localities are acquisitions.

Economic Geology.—We have to announce here the discovery of copper ore within twenty miles of the station of Darjeeling.

The letters from Dr. Campbell are as follows:

No. 45 of 1854.

To

H. PIDDINGTON, ESQ.,

Curator Museum of Economic Geology, Asiatic Society, Calcutta.

SIR,

On the 29th ultimo, I had the pleasure of sending to you by letter dák, a specimen of copper ore from Chakoong in Sikim, and of the copper extracted from it.

2. On the first instant, I despatched to you by dák banghy a specimen of copper ore from Pushak in the British territory attached to Darjeeling.

3. May I request that you will favour me with a report on these ores, and the metal.

4. Since the despatch of the specimens to you, I have visited the Pushak district. Annexed is copy of a letter from me to the Secretary to Government of Bengal on the subject for your information. The locality of the copper ores of Pushak is at an elevation of 2,000 to 2,500 feet above the level of the sea. The rocky belt containing the ore runs generally east and west. There is a deposit of tufa lime close to one of the copper veins.

A. CAMPBELL,

Superintendent.

Supt. Office, Darjeeling, the 7th January, 1854.

No. 43 of 1854.

To

CECIL BEADON, ESQ.,

Secy. to Govt. of Bengal, Fort William,

Dated Darjeeling, 7th January, 1854.

SIR,

I have much satisfaction in reporting for the information of Government that copper has been discovered in a portion of the hill territory attached to Darjeeling.

2. The existence of the ore was first brought to my notice by Rajiman, a pensioned sepoy of the local Sappers, to whom a specimen was brought by a Nepalese miner named Bulthamme Singh who had been employed in the vicinity in digging out a deposit of tufa lime. This man's acquaintance with the copper-yielding rocks in Nepal led him to examine similar formations here, and the result was the discovery of the ore.

3. I forwarded specimens of the ore and of the copper extracted from it to Mr. Piddington at the Asiatic Society's Museum ten days ago for examination, and I last night returned from a personal examination of the locality.

4. The district of Pushak, twenty miles road distance from Darjeeling, is the locality. I visited four different places in which the ore exists, had some dug out of each, and had a portion smelted in my presence by a party of Nepalese smelters, whom I had sent to the spot.

5. I have left a party of men to dig out more of the ore, and have employed the discoverer of it to make further search for other veins on the pay of ten rupees for one month with two attendants at four each. I have disbursed ten in presents to the people who have been employed, and I propose with the sanction of Government as a preliminary means of ascertaining the value of the ore, its extent, and distribution to expend not more than 100 Rs. after which I shall make a further report on the subject.

6. I have also to report that I have got specimens of copper ore from the Sikim territory adjacent to our territory but not in the same direction as Pushak.

7. If these ores of Pushak turn out at all equal in richness to the copper mines of Dunkoota in Nepal, this discovery will be very important one.

8. I have publicly intimated that copper ore wherever found in our territory under my controul is the property of Government. This is in

accordance to the original rules for the management of the Darjeeling tract when ceded to the British Government, and published in 1839.

I have, &c.

(Signed) A. CAMPBELL,
Superintendent.

Supt. Office, Darjeeling, the 7th January, 1854.

(True Copy).

(Signed) A. CAMPBELL,
Superintendent.

No. 52 of 1854.

To

H. PIDDINGTON, ESQ.

*Curator Museum of Economic Geology,
Asiatic Society, Calcutta.*

SIR,

On the 7th instant I had the pleasure to send you by dák No. 3 specimen of copper ore from Pushak in the Darjeeling territory. It was taken from a different place from No. 2, that is to say, it was from the same spur of the Pushak hill but 2 or 300 feet lower down, and close to a stream of water.

2. I have now the pleasure to send you a specimen No. 4, which I believe to be also a copper ore; it comes however from a different locality, but still in the neighbourhood of Pushak, and in the British territory. It was found at "Mungwah" a mountain spur to the south of Pushak. When fresh from the earth it was of an apple-green colour, portions of it are friable, with a golden tinge, and the crystallized structure of it is quite apparent. It was found about four feet below the surface. The top soil was red and yellow which attracted the attention of the searching party, and induced them to dig. I shall be glad to hear if it is a copper ore, and if you require more of it for examination, I shall send it to you. Call it the Mungwah specimen in alluding to it.

3. I have about 4 lbs. of metallic copper which has been obtained from the ore sent to you as No. 3, the ore was not weighed, but it is reckoned that about 80lbs. was used to obtain the above quantity of metal. This is a poor return, but the Nepalese smelters who are with me say that the poverty of a copper ore on the surface, is, in the Nepal mines no guide at all to the quality of the interior veins. I have got now about three maunds of the ore, which I purpose having weighed and carefully reduced,

you shall be informed of the result. As I took memoranda of the smelting process by the party I had with me at Pushak, I can let you have it also.

(Signed) A. CAMPBELL,
Superintendent.

Supt. Office, Darjeeling, the 17th January, 1854.

In a private reply to Dr. Campbell, requesting a better supply of the ores to enable me to take a fair average specimen (which is always a matter of great importance in pronouncing on the mineral value of ores in a commercial point of view) I have informed him as the results of my first, cursory, examination only, that—

No. 1. The Chakoong ore is a good Sulphuret of Copper (Copper pyrites) with Silica.

No. 2. The ore from Pushak is a Hornblendic schist with Copper pyrites and perhaps also Bismuth.

No. 3. Which is the only specimen which has a label, is marked as a "Carbonated Exudation." It is, I think, an earthy variety of the rare mineral Bismuthite or Carbonate of Bismuth, coloured in places by copper; but we have but a few water-worn and sintery fragments, and all we can say at present from the minute portion we can afford for examination is, that it is principally carbonate of Bismuth.

No. 4. Dr. Campbell's Mungwah ore is of no value; being only Hornblende and Tremolite (a variety of Hornblende) coloured by the decomposition of the common Hornblende.

The specimen of smelted copper sent is tolerably good, but somewhat brittle, from a portion of the Bismuth and Sulphur still remaining in it, I have told Dr. Campbell that he should make his native smelters roast their ores carefully before smelting which I believe they never do,* and that this will much improve the quality of his copper as well as its quantity, since there will be less copper, "burnt" as it is termed, i. e. evaporated in the smelting.

This discovery of copper ore at Darjeeling is remarkable in a geological point of view, inasmuch as it lies on the great north-east and south-west line, from Parisnath as a centre, on which so many localities of copper and other ores have been discovered, and on which I may add more are known, though their localities are not yet made public.

I have obtained by accident at the jail where it had been brought with the ballast for stone breaking! some very fine specimens of anthracite and

* Dr. Campbell informs me in reply that they do roast their ores; whether properly or not, is another question.

its sandstone, which I take to be American? These fine specimens are well worth adding to our stock of the mineral.

Report of Curator, Zoological Department, October Meeting, 1853.

A few specimens only have been added to the Society's collections during the past month; but these few comprise several species of interest, and some new to our museum.

1. Dr. Fayrer. A bottle of sundries from Rangoon. Among them is the COLUBER KORROS, Reinw., juv.,—HOMOLOPSIS HYDRINA, Cantor,—ELAPS MELANURUS, and a few *Arachnidæ* and *Termites*.

2. Capt. Haughton, Chaiebasa. Also two bottles of sundries, among which are EUBLEPHARIS HARDWICKII, Gray (*Gymnodactylus lunatus*, nobis, noticed in XVI, 633), HEMIDACTYLUS COCTÆI, ONYCHOCEPHALUS ACUTUS (very rare and highly acceptable), BOA CONICA, HELIX (affined to H. INSCULPTA, Benson), numerous Scorpions and Tarantulas, and some marine shells (BUCCINUM and IANTHINA), and Barnacles.

3. Dr. Kelaart, Colombo. A specimen of CYLINDROPHIS MACULATA and two bottles of marine fishes, the latter to be examined and returned.

4. Lt. Roberts, 7th Madras Cavalry. A young specimen of EMYS DHONGHOKA, Gray, picked up near Saugor in Central India; and a few marine shells from the Indian Ocean, comprising a fine CERITHIUM that we did not possess previously.

E. BLYTH.

November Meeting, 1853.

The contributions to our museum for the past month are as follow:

1. Babu Rajendra Mallika. A very large and fine male specimen of the Binturong (ARCTICTIS BINTURONG, Tem.; *Ictides ater*, Valenciennes), both skin and skeleton of which have been prepared.* Also the carcass

* This animal belonged to the Society, and was presented by Capt. Phayre, as noticed in my Report for July, 1847, *J. A. S.* XVI, 864: the Babu having long kept it for us in his menagerie. It continued tame to the last, but was less trustworthy from the time it had been pent up in confinement. The species is remarkable for being the only placental mammal of the Old World, or major continent, which is furnished with a truly prehensile tail: certain PARADOXURI only, to my knowledge, exhibiting even a slight degree of prehensiveness in that organ; unless the Pangolins (MANIS) may also be said to shew some power of the kind. No Old

of a doe *Bara Singha* Deer, (*CERVUS DUVAUCELEI*, F. Cuv., v. *C. elaphoides*, Hodgson.) A Wood Partridge (*PERDIX GULARIS*, Tem.): a Lory new to the museum (*EOS GUEBIENSIS*); and a young specimen of the great Indian Crane or *Sarrus* (*GRUS ANTIGONE*), with feathered head and neck, as seen likewise in young Turkeys, Guinea-fowls, and most other birds of which the necks are bare of feathers in the adult.

2. From the Barrackpore Menagerie. An adult male Monkey (*MACACUS CYNOMOLGOS*), since prepared as a skeleton; a fine adult female Nilgai (*PORTAX PICTUS*); and a Pelican Ibis (*TANLATUS LEUCOCEPHALUS*).

3. J. W. Payter, Esq., Jeypore. A skin of a Bat (*KERIVOULA PICTA*), identical in species with examples from Java, Ceylon, and the vicinity of Dacca.

E. BLYTH.

P. S.—I shall here append a short note to my paper on the Orang-utan genus, Vol. XXII, p. 369 *et seq.*

Prof. Owen, to whom I had sent sketches of the skulls of (adult females of) the four presumed species, writes word—"that my *S. WURMBII* and *S. ABELII* are one species does not surprise me: I have always wanted further evidence of their relations. That the female skulls, of which you sent me outlines, of *Mias Pappan* and *M. Rambi* belong to distinct species, would be very probable, were the character from nasal bones constant. I do not place so much stress on the parietal ridge or ridges, seeing the difference in the wear of the canine teeth in the two drawings."

Prof. Owen here evidently conjectures that the parietal ridges might approximate and finally unite with age: but a glance at the actual specimen figured would, I feel satisfied, convince any competent observer to the

World *Quadrumana*, like *MYCETES*, *ATELES*, *CEBUS*, and affined forms of S. America; nor *RODENTIA*, like the American Prehensile-tailed Porcupines and affined genera: and again, even among the *EDENTATA* of the same continent, the same power is shewn by the little Ant-eater. In the Kinkajou (*CERCOLEPTES*), a S. American genus not distantly affined to the Binturong, the prehensile power of the tail is much less perfect, as I can aver from personal observation of both animals. It is again completely exhibited by various marsupial genera, as the Opossums of America, and the Phalangiers of Australia, N. Guinea, the Philippines and Moluccas. Among reptiles, in the Chamæleons and arboreal Snakes; and among fishes, in the *HIPOCAMPI*. The plumed tail of many birds is made to serve as an effective *prop* in climbing, as familiarly exemplified by the Woodpeckers and Tree-creepers, certain Swifts, and even by all the *PELICANIDÆ* in a remarkable degree (as I have witnessed in Cormorants, Anhingas, Gannets, and Phætons or 'Tropic-birds').

contrary. Besides, quite a young male *Rambi* now belonging to Capt. S. R. Tickell, not $\frac{1}{3}$ grown during the time that I took care of it for him, had already a conspicuously developed single sagittal crest, with the lamdoidal ridges uniting to form it equally strongly marked, as seen in the living animal. Then, as before related, I have seen and attentively examined a living full grown female *Rambi*, which exhibited no sign of the facial callosities which exist in both sexes of the *Pappan*: and we possess the stuffed skin of a more than $\frac{1}{3}$ grown male *Rambi*, which also shews no trace of these callosities; whereas Sir J. Brooke states, that some young *Pappans* which he had shipped “(one of them *not a year old*, with two false molars,) shew them prominently.”

I have lately also received a communication from Sir J. Brooke, wherein he states, that—“A gentleman with me killed about a year ago a female Orang measuring from head to heel 5 ft.; and she was said to be small in comparison with a male before killed by a Malay. This female Orang had large cheek callosities.”

Prof. Owen continues—“The short-armed species can hardly be a variety of *MORIO*; and one other instance of the eurtailed development of the *radius* would quite satisfy me, other characters accompanying it, of this extremely interesting addition to the catalogue of anthropoid apes.”
—E. B.

February, 1854.

Our accessions to the Museum for the last three months are as follow:

1. M. Alfred Malherbe, Metz. A fine collection chiefly of bird-skins, with some mammalia and reptiles, from Europe and N. Africa (Algiers). Among the mammalia are *RHINOLOPHUS UNIHASTATUS*, *SCOTOPHILUS SEROTINUS*, and *PLECOTUS AURITUS*: *MYOXUS GLIS*; and a small Shrew sent in spirit as *CROCIDURA LEUCODON*, but which appears to be merely the common *CORSIRA VULGARIS* (v. *Sorex tetragonurus*, &c.)

Of birds, the most acceptable are *ERYTHROPUS VESPERTINUS* (particularly fine male); *ATHENE PSILODACTYLA*, (L., v. *noctua*, Retz., nec Tem.), from Algeria; *LANIUS MERIDIONALIS*, Algiers; *RUTICILLA TITHYS*, mas.; *CYANECULA* (with white breast-spot); *ANTHUS AQUATICUS* (*verus*); *BUDYTES NEGLECTA*; *MONTIFRINGILLA NIVALIS*;* *HERODIAS VERANY*

* Type of *MONTIFRINGILLA*, Brehm; and differing only from restricted *FRINGILLA* (as exemplified by the British Chaffinch and Bramblefinch, and the somewhat aberrant Himalayan *FR. BURTONI*,—*Carduelis Burtoni*, Gould, *Fr. erythrophrys*, nobis), by its longer wings and somewhat broader tail,—therein approximating the

(somewhat smaller and shorter-billed than *H. BUBULCUS*, but barely separable from the latter); *CICONIA NIGRA*, juv.; *CYGNUS MUSICUS*; and *PHALACROCORAX PYGMÆUS* from Algiers, sent as *Ph. africanus*, but perfectly identical with the common small Cormorant of India. Many other fine specimens are sent, but of species with which we were previously well supplied.

Of reptiles, *RANA ESCULENTA*, *SALAMANDRA MACULOSA*, Laurenti, and *LISSOTRITON PALMATUS*, (Daud., nec *L. PALMIPES*.)

Northern Snowfleck (*PLECTROPHANES*),—from which, indeed, it hardly differs more than *EMBERIZA PYRRHULOIDES*, Pallas, does from *EMB. SCHÆNICULUS*, which some ornithologists now consider to be merely varieties of the same species. We have observed the Snowfleck (*PLECTROPHANES NIVALIS*) alive, and kept it long in confinement; and we consider its affinity to be, decidedly, with the true *FRINGILLÆ*, and not with the *EMBERIZÆ*, to which it has generally been approximated. On the other hand, we would separate the long-winged ground Linnets (*LEUCOSTICTE*, Swainson), two or three Asiatic species of which (including *FRINGILLAUDA NEMORICOLA*, Hodgson, are assigned to *MONTIFRINGILLA* by Mr. Gould, unhesitatingly from the latter group, and adopt for them Mr. Swainson's name *LEUCOSTICTE*. Nearly affined, but on a larger scale, with longer bill having a slightly curved upper outline, and less elongated wings, there is the *PYRRHOSPIZA PUNICEA*, Hodgson, nobis (*Propyrrhula rubeculoides*, Hodgson); and other forms are akin, somewhat difficult to classify. The Himalayan red Finches known to me are as follow. 1. Restricted *PYRRHULA*, the true Bullfinches. Two species, *P. NIPALENSIS*, Hodgson, and *P. ERYTHROCEPHALUS*, Vigors. 2. *PYRRHULOIDES EPAULETTA*, (Hodgson). 3. *PROPYRRHULA SUBHEMACHALANA*, (Hodgson). Combines the beak of *PYRRHULA*, scarcely less broad, with the plumage of *STROBILOPHAGA* (*Corythus*) and *LOXIA*; only softer, and the wings are shorter and more rounded. *STROBILOPHAGA* leads from this to No. 4, *LOXIA*; of which a peculiar species exists in *L. HIMALAYENSIS*, Hodgson, as much smaller and weaker than *L. CURVIROSTRA* as *L. PYTIOPSITTACUS* is larger and stouter. *L. CURVIROSTRIS* I have seen alive from Afghanistan. Then we must interpolate the (5) *HÆMATOSPIZA SEPAHI*, Hodgson, nobis; and after this may follow the (6) *CARPODACI*, viz. *C. RUBICILLA*, (Gould, v. *Coccothraustes caucasicus*, Pallas), from Kashmir, &c.—*C. RODOCHLAMYS*, (Brandt, v. *C. sophia*, Bonap., and *C. grandis*, nobis,)—and the common Indian *Tuti*, which I have much reason to doubt is identical with the northern *C. ERYTHRINA*. 7. Next follows a group to which the N. American *C. PURPUREUS* seems to lead, with less tumid bill, and the plumage of the males more or less of a vinaceous red colour. *PHÆNICO-SPIZA*; nobis; two Himalayan species, *PH. RODOPEPLA*, (Vig.), and *PH. RODOCHROA*, Vigors. 8. Hardly separable from the last except by its more slender bill, follows the *PROCARDUELIS NIPALENSIS*, Hodgson: and then we have *PYR-*

2. L. C. Stewart, Esq. now of H. M. 61st Regt., Wuzcerabad. Selections, from two collections, of such specimens as were required for the museum; their place to be supplied by examples of various Bengal and other species, not required by the Society.

From a small collection, chiefly of birds, procured in the Madras Presidency, we have obtained a good skin of *SCIURUS MACROURUS*, Forster, shot near Bangalore, and precisely identical with Ceylon specimens: long ago we received on loan a Travancore example of this species from Mr. Walter Elliot; and we possess a bad skin of it from the Nilgiris: so that its occurrence on the mainland of India is now thoroughly established. Also horns of both sexes of the so called Nilgiri Ibex (*KEMAS HYLOCRIVS*, Ogilby), the representative in the Nilgiris of the *Tehr* or *Jharal* of the Himalaya (*K. JEMLAICUS*). Of birds, the rare *PARUS NUCHALIS*, Jerdon, from a tope near Bangalore; and a specimen in winter dress, shot near Madras, of *LOBIPES HYPERBOREUS*, (L.)! It is the first instance recorded of the occurrence of this arctic or sub-arctic (and even rare British) species in India, where it can only be considered as an exceedingly rare and accidental straggler; and only one instance is known of the occurrence of the affined *PHALAROPUS FULICARIUS*, (L.), in India,—a specimen *in winter dress*, and very lean, but with the plumage in fine order, having been procured by myself in the Calcutta provision bazar, brought with Snipes, &c., on May 11th, 1846.

Mr. Stewart's second collection is a most extensive one, procured chiefly in the vicinity of Landour, and in the Deyra Doon. We derive from it several skulls of mammalia, including that of an adult male *Langur*, *PRESBYTIS SCHISTACEUS*, Hodgson, considerably larger than (and well distinguished from) those of adult males of the Bengal *Hunuman*, *PR. ENTELLUS*; also a fine skull of a *Chiru*, *PANTHALOPS HODGSONII*.

RHOSPIZA PUNICEA (scarcely separable from the last, generically), and the *LEUCOSTICTE* group, followed by the European Linnets and Redpoles, Siskins and Greenfinches, Serins, Goldfinches, &c.; the typical red plumage passing into green and yellow,—and finally the various forms of true Fringilline Grosbeak, and the Chaffinches, Snowfinch, and northern Snowfleck, which last (as aforesaid) has no immediate affinity for the *EMBERIZINÆ*, nor has the Alpine Snowfinch (*MONTIFRINGILLA NIVALIS*) for *LEUCOSTICTE*. It is remarkable that the Chaffinches (restricted *FRINGILLA*) are partly insectivorous, and feed their young with insects; as the Sparrows also do: whereas the Linnets, Greenfinches and affined forms (of which the domestic Canary may be considered typical,) rear their young upon macerated vegetable diet ejected from the craw or dilatation of the *œsophagus*, and appear never to touch insect-food of any kind.

Of skins of mammalia, *VULPES MONTANUS*, very fine; *PARADOXURUS GRAYI* (*P. nipalensis*, Hodgson); and two of *MUSTELA SUBHEMACHALANA*, Hodgson.*

Among the birds, a noble *AQUILA CHRYSÆTOS*, fully mature; *BUTEO VULGARIS* (*rufiventer*, Jerdon)†; *CIRCUS CYANEUS*, fine ashy male; *KETUPA FLAVIPES*, (Hodgson), young; *HEMILOPHUS PULVERULENTUS*, from the Deyra Doon (three specimens obtained; we previously possessed this largest of Asiatic woodpeckers, an inhabitant chiefly of the Malayan peninsula, from Arakan, and had been assured that it had been seen and recognised at Darjiling; and few Woodpeckers would be more easy to recognise even at a distance, from its great size and very peculiar colour); *TIGA SHOREI*, m. and f.; *CYPSELUS LEUCONYX* (the N. W. Himalaya appears to be the main habitat of this species, which rarely strays so far as Bengal or S. India; it is distinguished from the nearly affined *C. VITTATUS* of the Malay countries and China by its smaller size and proportionally smaller feet, the claws of which are commonly but not always white or whitish); *PARUS MODESTUS* (*Sylviparus modestus*, Eyton, v. *P. sericophrys*, Hodgson); *EUSPIZA FUCATA* (apparently not uncommon, and seeming an irregular and uncertain winter visitant in Lower Bengal); *EU. STEWARTI*, n. s.;‡ *ACCENTOR VARIEGATUS*, nobis, several; *ALAUDA LEIOPUS*, Hodgson;§ *ANTHUS CERVINUS*, fine; *GRANDALA CÆLICOLOR*;

* The museum is ill supplied with skins of the Himalayan true *MUSTELÆ*.

† There are five unmistakeable skins of this species; and it seems now that this is the ordinary hill or rather mountain Buzzard of India, replaced by *B. RUFINUS* on the plains: the latter is larger, and varies much less in the colours of its plumage, than the other.

‡ *EUSPIZA STEWARTI*, nobis. Affined to *EU. CÆSIA* (Cretsch.) Length about $5\frac{1}{2}$ in.; of wing 3 to $3\frac{1}{4}$ in.; and tail $2\frac{1}{2}$ in. Crown and front of neck ashy; the ear-coverts and upper-parts of breast albescent-ashy; throat and supercilia black, the feathers of the former margined with whitish towards the chin; lower half of breast, flanks partly, nape, back, rump, upper tail-coverts, and fore-part of wings, deep-ferruginous approaching to maronne, the feathers more or less bordered paler: rest of wings dusky, the feathers margined with brown; and belly and lower tail-coverts buffy-white; tail having its outermost feather $\frac{2}{3}$ white, and the next $\frac{1}{2}$ white. A younger male, or seemingly shot earlier in the breeding season, has the fore-part of the wing less rufous, the pale margins to the feathers generally rather more developed, and slight central dusky spots on those of the back.

§ *ALAUDA LEIOPUS*, Hodgson. Absolutely resembles the British Sky Lark (*A. ARVENSIS*, v. *dulcivox*, Hodgson), except in being smaller. Length of wing $3\frac{1}{2}$ to $3\frac{3}{4}$ in., and of tail $2\frac{1}{4}$ in. This species was long ago sent to the museum by

RUTICILLA ERYTHROGASTRA, (Guld., v. *R. tricolor*, Gould; this fine and very rare Himalayan bird was obtained by a mountain stream near Landour,—there were a pair of them, apparently alike in colour); TARSIGER CHRYSÆUS, H.; CYORNIS ŒQUALICAUDA, nobis, *J. A. S.* XX, 523, another female (the male being still unknown*); PHYLLOPNEUSTE OCCIPITALIS, two (previously only known from a single specimen procured in S. India by Mr. Jerdon); REGULOIDES CHLORONOTUS; HOUBARA MACQUEENII; LOBIVANELLUS LEUCURUS (the only Indian specimen previously recorded having been obtained by myself in the Calcutta bazar); PORZANA AKOOL (Deyra Doon); P ZEYLONICUS, Ind. var. (resembling a specimen from Gumsur, and in like way differing from a Cinghalese one, vide *J. A. S.* XXI, 353; also Deyra Doon); and some others unworthy of particular note. Three specimens of an Egret in winter dress would seem to differ only from ordinary HERODIAS GARZETTA in having black toes.

T. C. Jerdon, Esq., Mhow. A few bird-skins from the vicinity of that station; of which the most remarkable is an example of LOCUSTELLA RAYI, nobis, the British Grasshopper Warbler, which would appear to be there not uncommon. We had previously seen a specimen from the N. W. Himalaya.† Also CHÆTUSIA GREGARIA (mistaken in Mr. Jerdon's Cata-

Mr. Hodgson from Nepal; but the specimens were in such bad order that I could not satisfactorily distinguish them from A. GULGULA (the common Lark of the plains of India and of Bengal). From the latter it may be distinguished, however, by its smaller bill and longer tail. N. B. The supposed M. MALABARICA, Scopoli (*A. deva*, Sykes), of my Catalogue of the Birds in the Society's museum, I now believe to be merely A. GULGULA in much abraded plumage.

* Qu. C. PALLIPES, (Jerdon) ?

† I believe that I first termed this species L. RAYI, some fifteen years ago, and Mr. Gould adopts this name for it in his 'Birds of Europe.' Mr. G. R. Gray terms it LOCUSTELLA AVICULA, Ray; but the latter word was assuredly never meant for a name or specific designation. M. Degland styles it L. NÆVIA, from its being the *Curruca grisea nævia* of Brisson, and gives *L. Rayi*, "Gould," as a synonyme; but this I think is hardly admissible. A second species is not rare in the vicinity of Calcutta during the cold season, especially about the Salt-water Lake, where it is often taken alive and brought to the provision bazar, along with the various small Rails and Water-Crakes; but such specimens are generally mutilated by the dealers, who tear off the quills of one wing and often the tail with it, according to their vile wont. I now suspect that this second, true and typical species of LOCUSTELLA (my L. RUBESCENS, *J. A. S.* XIV, 582), is no other than the *Turdus certhiola*, Pallas (*Sylvia c.*, Tem.), from N. Asia, and so very rare in collections. DUMETICOLA THORACICA, nobis (*Salicaria affinis*, Hodgson), appears to approximate the European LOCUSTELLA FLUVIATILIS, (Meyer); and TRIBURA

logue of the birds of the peninsula of India for *HOPLOPTERUS VENTRALIS*),

A. Campbell, Esq. Darjiling. Imperfect skin of a young fawn of the *Shou*, or Tibetan Stag (*CERVUS WALLICHII*); as also an imperfect skin of a half grown *Shou*, asserted to be of a distinct and peculiar species by Dr. Campbell's native informant. We do not hesitate to refer both to the *Shou*; and may remark that the fawn skin is very much speckled or *menilled* with white, much more so than a new-born fawn of the *Wapiti* Stag (*C. CANADENSIS*), which we saw alive.* Also the skin of a reptile (*HYDROSAURUS SALVATOR*).

E. F. Kelaart, Esq. M. D., Ceylon Medical Service, Galle. Series of horns of *AXIS ORYZEUS*, Kelaart, of three ages. We are unable to distinguish them from the horns of *A. PORCINUS*, or the Hog Deer of the Gangetic provinces and of Burma; which species may possibly have been introduced into Ceylon, though unknown in the peninsula of India.† The Hog Deer of the Indus territories is distinct (*CERVUS DODUR*, Royle); and of this we have no specimens in our museum. Dr. Kelaart has also forwarded some reptiles, but they have not yet come to hand.

W. Bracken, Esq. C. S. Skin of a *Likh* (*SYPHEOTIDES AURITUS*), termed *Floriken* in S. India; shot near Calcutta.

J. Swarris. Skin of a Leopard Cat (*FELIS BENGALENSIS*), shot near the light-house on Saugor Point; an unexpected locality for the species.

C. A. Jones, Esq. A dead Cockatoo (*CACATUA GALERITA*), which had "lived above forty years in the family."

J. Barlas, Esq., Rangoon. Specimen of a well known moth, from Burma, *PH. PATROCLUS*, L. (Cramer, pl. CIX, *a*, *b*): a splendid species common in collections from China, Asám, Sylhet, and Arakan.

LUTEOVENTRIS, Hodgson, placed by me dubiously as a *PSEUDOLUSCINIA*, Bonap., may even prove to be the European *Ps. SAVII*, Bonap. (*Sylvia luscinioides*, Savi); but our specimens of these two Himalayan birds are very bad, and we can therefore arrive at no satisfactory conclusion from comparing of them with descriptions taken from fine and perfect specimens.—Since the foregoing note was written, we have received a Bengal specimen of *LOCUSTELLA RAYI*.

* We have been assured that the Stag of Kashmir, though in general bearing a simply bifurcating crown, as in the Tibetan specimens hitherto examined, yet has been seen with as many as 18 points in all, and that 12 and 14 are not very uncommon. We trust soon to have the opportunity of comparing Tibetan and Kashmirian specimens.

† Dr. Kelaart has since forwarded a living adult male; and the species is exactly intermediate to the *AXIS MACULATUS* and *A. PORCINUS* of Bengal, in form (including horns), size, and colouring.

P. S.—From seeing the fourth number of Gould's 'Birds of Asia,' I find that the fragments of a large *CARPODACUS* from Kashmir, noticed in *J. A. S.* XXII, 583, pertain to a specimen of *C. RUBICILLA*, (Brandt, v. *Coccothraustes caucasicus*, Pallas); also that my *C. grandis*, *J. A. S.* XVIII, 810, from the Tyne range beyond Simla, = *C. RODOCHLAMYS* (Brandt, v. *C. sophia*, Bonap. and Schlegel). The difference in the brightness of colouring of Mr. Gould's male specimens of *C. RUBICILLA* from different localities is merely seasonal, and exactly corresponds with what I have observed of the common Indian species, currently referred to *C. ERYTHRINUS*. No. 938 of my Catalogue of Birds in the Society's museum is correctly identified; but the earliest name for the species is *TURDUS FUSCATUS*, Pallas. Of *T. RUFICOLLIS*, Pallas, Mr. Gould mentions the suspicion that it is merely a variety of *T. ATROGULARIS*, Natterer; and states that he had "never seen a specimen of the latter species with any other than blackish-brown tail-feathers; if I had," he adds, "I should have become a convert to the opinion of those who consider the two birds to constitute but a single species." Had he turned to my Catalogue, however, which he quotes, he would have found it stated of *T. RUFICOLLIS*, that it is "perhaps a variety of *T. ATROGULARIS*, of which some specimens are partially rufous-tailed." We have such in our museum. I strongly suspect, also, that *MERULA CASTANEA*, Gould, is an analogous variety of *M. ALBOCINCTA*, (Royle); and *GEOCICHLA DISSIMILIS*, nobis, of *G. UNICOLOR*.* No. 1465 of the same Catalogue is *EUPLOCOMUS VIEILLOTI*, (G. R. Gray); distinct, it now appears, from *EU. IGNITUS*. Mr. Gould

* In a letter just opportunely received from Capt. Thos. Hutton, that observer writes—"I incline now to think that *MERULA CASTANEA* is distinct from *M. ALBOCINCTA*, on account of difference of habit; the former is in large parties, the latter always single and solitary. *TURDUS RUFICOLLIS* I do not know in these parts; but *T. ATROGULARIS* is abundant here in winter and also in Afghanistan. *GEOCICHLA DISSIMILIS* and *UNICOLOR* may probably be the same, though I think not, as I have never seen a bird answering to your description of the former."

The same gentleman adds, in reply to another enquiry of mine,—“I never saw *CORVUS CORAX* in all my wanderings, nor yet in any collection made in the hills; and have no faith in its existence in these parts.” So Mr. Hodgson also lately assured me, that he had never heard of it to the southward of the snowy ranges, though common in Tibet. But in a letter just received from Mr. L. C. Stewart, now at Wuzeerabad, that observer writes—"CORVUS CORAX abounds, and is as impudent and familiar as *C. SPLENDENS*. He seems to replace *C. CULMINATUS*, as I have not seen one of the latter. There can be no mistake, for he is as big as a half-grown Turkey." A specimen would be very acceptable from that locality.

has coloured the cere and feet of our common Indian Kite of too deep a yellow. In his opinion, this bird and the *MILVUS ATER* of Europe and the *M. AFFINIS* of Australia “form three very distinct species, of which the [Indian] *M. GOVINDA* is by far the largest and finest.” Their distinctive characters, however, are not pointed out. *MUSCIPETA INCEI*, Gould, from the neighbourhood of Shanghai, is nearly related to my *M. AFFINIS* from the Malay countries, &c.; but seems distinct. A beautiful *SUTHORA* is figured, from China, distinct from the four N. Indian species (*RUFICEPS*, *FULVIFRONS*, *NIPALENSIS*, AND *POLIOTIS*),—*S. WEBBIANA*, G. R. Gray; and two varieties are represented of *S. NIPALENSIS*, Hodgson,—one with dark ashy crown, and white checks passing into pale ashy posteriorly (not my *S. POLIOTIS*, *J. A. S. XX*, p. 32, from the Khásya hills),—the other with rufous crown and ear-coverts, and an ashy mark behind the latter,—possibly a sexual distinction. This should be investigated by any ornithologist who has the opportunity.—E. B.

LIBRARY.

The following additions have been made to the Library since December last.

PRESENTED.

Sanskrit-Wörterbuch herausgegeben von der Kaiserlichen Akademie der Wissenschaften. Bearbeitet von Otto Böhtlingk und Rudolph Roth. Erste Lieferung, St. Petersburg 1853, 4to.—BY THE EDITORS.

Selections from the Records of the Government of India No. II. Punjab Report. No. III. Sir C. Napier's Resignation.—BY THE GOVT. OF INDIA.

Selections from the Records of the Government of Bengal No. XIII. Notes on the manufacture of Salt in the Tumlook Agency, &c. 2 copies.—BY THE GOVT. OF BENGAL.

Journal of the Indian Archipelago for April and May, 1853.—BY THE SAME.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Mathematisch Naturwissenschaftliche Classe. Band X. IV. und V. heft.—BY THE VIENNA ACADEMY.

Ditto ditto Philosophisch-Historischen Classe. Band X. IV. heft.—BY THE SAME.

Annales de l'Academie d'Archéologie de Belgique. Tome VI. 3me Livraison. Tome VII. Tome VIII. 1er. Livraison et Tome X. 2me Livraison.—BY THE ACADEMY.

Statuts de l'Ordre Chapitral d'Ancienne Noblesse des quatres empereurs d'Allemagne. Anvers 1838. Pamphlet.—BY THE SAME.

Memoire sur la Noblesse et les moyens de la Relever ; accompagné de quelques réflexions concernant l'impôt que l'on propose d'établir sur les concessions Nobiliaires. Anvers 1849. Pamphlet.—BY THE SAME.

Recueil des Actes de l'Académie des Sciences, Belles-lettres et arts de Bordeaux, 2e, 3e et 4e trimestres des 1852, et 1er Trimestre de 1853.—BY THE ACADEMY.

Observations made at the Magnetical and Meteorological Observatory at Toronto in Canada, printed under the superintendence of Col. E. Sabine. Vol. II. 1843-5.—BY THE BRITISH GOVERNMENT.

Transactions of the Royal Society of Edinburgh vol. XX. pt. IV.—BY THE SOCIETY.

Proceedings of the Royal Society of Edinburgh. Sessions 1852-3.—BY THE SAME.

The white Yajur Veda, edited by Albrecht Weber. Part II. Nos. 2, 3.—BY THE EDITOR.

Memoirs of the Royal Astronomical Society, vol. XXI.—BY THE SOCIETY.

Monthly Notices of the Royal Astronomical Society, vol. XII.—BY THE SOCIETY.

Tidschrift voor Indische Taal, Landen Volkenkunde, nitgegeven door het Bataviaasch Genootschap van kunsten en Wetenschappen. Jhargang I. Aflevering I. II. III. and IV.—BY THE BATAVIAN SOCIETY OF SCIENCES.

Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen, vols XX. to XXIV.—BY THE SAME.

A Narrative of the Insurrection which happened in the Zemindary of Banares in the month of August 1781.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Derde Bijdrage tot de kennis der Ichthyologische Fauna van Ceram, Door Dr. P. Bleeker.—BY THE AUTHOR.

Verslag von de Vergadeomy des Naturskundize Vereeniging in Nederlandsch Indie Gebouden den 9 den November 1853.—BY THE SAME.

Vierde Bijdrage tot de kennis der Ichthyologische Fauna van Amboina, Door Dr. P. Bleeker.—BY THE SAME.

Nalczingen Vop de Ichthyologische Fauna van het Eiland Banka, Door Dr. P. Bleeker.—BY THE SAME.

Vierde Bijdrage tot de Kennis der Ichthyologische Fauna van Celebes, Door Dr. P. Bleeker.—BY THE SAME.

Overzicht der Geschiedenis van het Bataviaasch Genootschap von kunsten en Wetenschappen von 1778—1853—Door Dr. P. Bleeker.—BY THE SAME.

Bijdrage tot de Kennis der Troskienwige Visschen von der Indischen Archipel, Door Dr. P. Bleeker.—BY THE SAME.

Zeitschrift der Deutschen Morgenländischen Gesellschaft. Achtes Band I heft.—BY THE SOCIETY.

The Quarterly Journal of the Geological Society, vol. IX. pt. IV.—BY THE SOCIETY.

Bulleten de la Societé de Géographie, 4me serie, Tome V.—BY THE SOCIETY.

Journal of the American Oriental Society, fourth volume, No. I.—BY THE SOCIETY.

Upadeshak, No. 85.—BY THE EDITOR.

The Oriental Christian Spectator, November and December, 1853.—BY THE EDITOR.

The Oriental Baptist, No. 85.—BY THE EDITOR.

The Calcutta Christian Observer for January, 1854.—BY THE EDITOR.

Journal of the Agricultural and Horticultural Society of India, vol. VIII. p. 4.—BY THE SOCIETY.

Bibidhārtha Saṅgraha, No. 23.—BY THE EDITOR.

The Citizen, for December and January last.—BY THE EDITOR.

Purnachandrodaya, Newspaper, for January, 1854.—BY THE EDITOR.

Exchanged.

Jameson's Journal, No. 110.

The Athenæum, for October, 1853.

The Philosophical Magazine, Nos. 39, 40.

Purchased.

The Edinburgh Review, No. 200.

Journal des Savants, for September, 1853.

Comptes Rendus, Nos. 11 to 17.

The Annals and Magazine of Natural History for Oct. and Nov. 1853.

Ibn el Athiri Chronicon quod perfectissimum inscribitur, 2 vols.

RA'JENDRALA'L MITTRA.

Feb. 1st, 1854.

FOR MARCH, 1854.

At a meeting of the Asiatic Society held on the 1st inst. at the usual hour,

C. Allen, Esq., Senior Member of the Council present, in the Chair.

The minutes of the preceding month were read and confirmed.

Presentations were received —

1. From E. C. Colebrooke, Esq. Reports of Summary Cases determined in the Sudder Court, during 1849—52.
2. From the Government of Fort St. George through the Chief Secretary Sir H. Montgomery, Reports of the Madras Central Museum, for 1853.
3. From Lady Elliot, a complete copy of Rees's Cyclopædia in 43 volumes.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

Major M. E. Loftie, 30th Regt. N. I.

Lt. W. Hichens, Bengal Engrs.

C. E. Chapman, Esq. B. C. S.

Notes were recorded from Mr. Earle and Bábu Gyanendramohun Tagore, expressing their wishes to withdraw from the Society.

Pursuant to notice given at the last meeting Mr. Houstoun desired "to know under what decision of the members assembled, in general meeting letter No. 217 of the 3rd December, 1853, was written, and made to appear as if the act and deed of the Society."

The chairman pointed out By-law 77, which invests the Council with the necessary authority, and reminded Mr. H. that the letter had been read and approved by the December meeting. Mr. H. then recorded a protest.

The chairman on behalf of the Council proposed the following resolution, which was seconded by Major Abbott.

"Resolved that the Society is willing to become instrumental to the extent of its power in giving to the world Sir H. Elliot's unpublished works in any way in which Lady Elliot, and the friends of the late Sir H. Elliot may consider that the Society's services may be useful."

Rev. K. M. Banerjea opposed the resolution and, in order to meet his objection, Mr. Houstoun proposed as an amendment that "enquiry be made of Lady Elliot if the Society could in any way assist her in giving to the world the unpublished works of the late Sir Henry Elliot."

On being put to the vote, however, the amendment was lost

The original proposition was then carried by a large majority. The Rev. K. M. Banerjea entered a protest, which was duly recorded.

Meteorological Registers kept at the office of the Secretary to the Government of the N. W. Provinces for the months of November and December last, were laid on the table.

Read a paper by Professor Oldham, communicated by the Government of Bengal, and entitled notes upon the Geology of Rajmahal hills, and a letter from the Professor, dated the 15th February, pointing out the economic uses to which coal may be applied on the proposed line of railway from Soory to Rajmahal, coal being found in several places on the western flank of the Raj-mahal hills.

From H. Piddington, Esq. communicating a paper by Dr. Gordon of her Majesty's 10th Foot, on the dust whirlwinds of the Punjaub.

Referred to the Journal Committee.

The Librarian having submitted his usual monthly report of additions to the Library, the meeting adjourned.

Read and confirmed 6th April, 1854. (Signed) J. W. COLVILLE.

LIBRARY.

The following additions have been made to the library since February last:—

Presented.

Rees's Cyclopædia in 43 volumes.—PRESENTED BY LADY ELLIOT.

Reports of Summary Cases determined in the Court of Sudder Dewanny Adawlut during 1849–52.—By E. C. Colebrooke, Esq. Calcutta, 1854, 8vo.—BY THE AUTHOR.

Reports of the Revenue Administration of Hazaribág, Arakan, Tenasserim Provinces and Assam, for 1850–51.—BY THE GOVT. OF BENGAL.

Reports on the Government Central Museum, 1853, 2 copies.—BY THE SAME.

Ditto ditto.—BY THE GOVERNMENT OF MADRAS.

Journal Asiaticque, No. 7.—BY THE ASIATIC SOCIETY OF PARIS.

The Calcutta Christian Observer, for February, 1854.—BY THE EDITORS.

The Upadeshak, No. 86.—BY THE EDITOR.

The Oriental Baptist, No. 86.—BY THE EDITOR.

The Oriental Christian Spectator, for January, 1854.—BY THE EDITOR.

The Satyárnab, No. 3.—BY THE REV. J. LONG.

The Bibidhártha Sañgraha, No. 24.—BY THE EDITOR.

Exchanged.

The Athenæum, for November, 1853.

Purchased.

Toison d' Or de la Langue Phenicienne par Mr. l'Abbe F. Bourgade.

Comptes Rendus, 31st October to 28th November, 1853.

Journal des Savants, for November, 1853.

Annals and Magazine of Natural History, No. 72.

Burnes's Bokhara, 3 vols. 12mo.

Robinson's Assam, 1 vol. 8vo.

RA'JENDRALA'L MITTRA.

March 1st, 1854.

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of December, 1853.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Tem- perature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.968	30.041	29.906	0.135	69.3	80.2	57.3	22.9
2	.985	.064	.942	.122	68.9	78.8	57.0	21.8
3	30.022	.103	.973	.130	69.2	78.3	58.0	20.3
4	<i>Sunday.</i>							
5	29.958	.027	.894	.133	67.7	78.2	55.5	22.7
6	.952	.040	.876	.164	67.3	79.0	54.8	24.2
7	.966	.043	.913	.130	67.0	78.6	58.5	20.1
8	.981	.057	.905	.152	66.4	77.0	54.0	23.0
9	.975	.043	.913	.130	64.4	74.7	51.4	23.3
10	30.003	.081	.928	.153	65.9	76.0	51.7	24.3
11	<i>Sunday.</i>							
12	.010	.090	.947	.143	68.3	78.4	56.5	21.9
13	.004	.089	.947	.142	68.1	78.5	56.0	22.5
14	.019	.107	.957	.150	68.6	79.0	56.6	22.4
15	.025	.113	.975	.138	68.3	79.0	55.6	23.4
16	.020	.091	.965	.126	68.4	78.9	56.0	22.9
17	.037	.113	.973	.140	68.0	79.0	55.8	23.2
18	<i>Sunday.</i>							
19	29.993	.085	.930	.155	65.4	76.4	53.0	23.4
20	.987	.066	.926	.140	64.5	77.0	51.0	26.0
21	.992	.069	.930	.139	64.2	76.0	50.9	25.1
22	30.053	.126	.985	.141	65.0	76.7	50.9	25.8
23	.071	.158	30.008	.150	66.3	77.0	53.9	23.1
24	.022	.114	29.943	.171	66.1	76.2	53.8	22.4
25	<i>Sunday.</i>							
26	.058	.130	.995	.135	67.5	78.0	56.0	22.0
27	.126	.195	30.075	.120	66.9	78.8	53.8	25.0
28	.102	.188	.025	.163	67.6	78.3	55.5	22.8
29	.062	.150	.000	.150	67.4	77.2	56.3	20.9
30	.039	.116	29.997	.119	66.1	76.2	55.3	20.9
31	.048	.135	.996	.139	65.3	77.4	52.4	25.0

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of December, 1853—(Continued.)*

Date.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity, complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	61.6	7.7	56.4	12.9	0.464	5.10	2.73	0.651
2	61.9	7.0	57.3	11.6	0.477	5.26	2.48	.680
3	62.9	6.3	58.9	10.3	0.504	5.56	2.25	.712
4	<i>Sunday.</i>							
5	61.7	6.0	57.8	9.9	0.486	5.37	2.09	.720
6	60.8	6.5	56.4	10.9	0.463	5.12	2.25	.695
7	59.9	7.1	54.8	12.2	0.440	4.86	2.44	.666
8	59.2	7.2	54.0	12.4	0.427	4.74	2.43	.661
9	57.9	6.5	53.0	11.4	0.414	4.61	2.13	.684
10	60.2	5.7	56.3	9.6	0.462	5.13	1.93	.727
11	<i>Sunday.</i>							
12	63.1	5.2	59.9	8.4	0.521	5.76	1.84	.758
13	63.3	4.8	60.4	7.7	0.529	5.85	1.70	.775
14	63.1	5.5	59.7	8.9	0.517	5.72	1.95	.746
15	62.7	5.6	59.1	9.2	0.508	5.61	1.99	.738
16	62.5	5.9	58.7	9.7	0.501	5.53	2.09	.726
17	60.9	7.1	56.0	12.0	0.458	5.06	2.47	.672
18	<i>Sunday.</i>							
19	58.1	7.3	52.6	12.8	0.408	4.53	2.42	.652
20	57.4	7.1	52.0	12.5	0.399	4.44	2.32	.657
21	56.9	7.3	51.2	13.0	0.389	4.33	2.36	.647
22	58.2	6.8	53.1	11.9	0.415	4.62	2.25	.672
23	60.3	6.0	56.2	10.1	0.460	5.11	2.04	.715
24	60.3	5.8	56.3	9.8	0.462	5.13	1.97	.723
25	<i>Sunday.</i>							
26	61.2	6.3	56.9	10.6	0.472	5.20	2.22	.701
27	60.8	6.1	56.6	10.3	0.467	5.17	2.11	.710
28	61.6	6.0	57.7	9.9	0.484	5.35	2.09	.719
29	60.8	6.6	56.3	11.1	0.462	5.11	2.28	.691
30	59.3	6.8	54.4	11.7	0.434	4.80	2.30	.676
31	58.3	7.0	53.0	12.3	0.414	4.60	2.33	.664

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of December, 1853—(Continued.)*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
1	o	Inc.		
2	94.0	..	W. or N. W. or N.	Cloudless.
3	94.5	..	N. or N. W.	Ditto.
4	94.0	..	N. N. W. or N. W.	Ditto.
5	<i>Sunday.</i>			
6	93.5	..	N. W.	Cloudless.
7	92.0	..	N. W. or Calm.	Ditto.
8	98.5	..	N. W.	Ditto.
9	86.0	..	Calm or N. W.	Ditto.
10	91.0	..	N. W.	Ditto.
11	96.2	..	Ditto.	Cloudy till 6 A. M. cloudless afterwards.
12	<i>Sunday.</i>			
13	95.9	..	Calm or N. W.	Cloudless.
14	93.6	..	N. N. W. or N. W.	Ditto.
15	98.0	..	N. W.	Ditto.
16	89.8	..	Ditto.	Ditto.
17	97.0	..	Calm or N. W.	Cloudless till 4 A. M. scattered \i till
18	90.0	..	N. or N. W.	10 A. M. cloudless afterwards.
19	<i>Sunday</i>			Cloudless.
20	89.6	..	N. W.	Cloudless.
21	88.0	..	Calm or W. or N.	Ditto.
22	92.0	..	N. W. or N.	Ditto.
23	98.6	..	N. or N. W.	Ditto.
24	....	..	Ditto.	Ditto.
25	....	..	N. W.	Ditto.
26	<i>Sunday.</i>			
27	....	..	Calm or N. W. or N.	Cloudless till 6 A. M. scattered \i or \i till 6 P. M. cloudless afterwards.
28	....	..	W. or N. W.	Cloudless till 6 A. M. scattered \i till 5 P. M. cloudless afterwards.
29	....	..	N. W. or W. or calm.	Cloudless till 7 A. M. scattered \i till 5 P. M. cloudless afterwards.
30	....	..	N. W. or W.	Cloudless.
31	....	..	Calm or N. W.	Ditto.
	....	..	Ditto.	Ditto.

Symbols, {
\ i Cirri.
\ i Cirro-strati.
^ i Cumuli.
^ i Cumulo-strati.
\ i Nimbi.
— i Strati.
\ i Cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of January, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Tempera- ture during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	<i>Sunday.</i>							
2	30.019	30.106	29.977	0.129	65.0	77.2	55.6	21.6
3	29.998	.074	.945	.129	66.6	77.7	58.5	19.2
4	.988	.052	.934	.118	67.7	78.0	60.3	17.7
5	30.049	.141	30.004	.137	67.6	77.8	59.6	18.2
6	.058	.143	29.988	.155	68.5	79.9	60.2	19.7
7	.034	.118	.967	.151	68.7	80.0	60.0	20.0
8	<i>Sunday.</i>							
9	.051	.126	.994	.132	67.8	78.2	59.2	19.0
10	.100	.177	30.047	.130	65.8	76.4	57.0	19.4
11	.078	.178	.017	.161	64.7	76.6	54.2	22.4
12	.031	.108	29.957	.151	64.0	75.8	55.0	20.8
13	.052	.103	.998	.105	65.6	77.4	55.4	22.0
14	.080	.170	30.035	.135	66.9	78.7	57.4	21.3
15	<i>Sunday.</i>							
16	.038	.119	29.985	.134	66.6	78.4	56.5	21.9
17	.025	.112	.965	.147	65.8	77.7	56.3	21.4
18	.000	.078	.934	.144	64.8	77.8	54.6	23.2
19	29.992	.078	.924	.154	64.4	77.7	54.4	23.3
20	.999	.085	.929	.156	65.2	78.4	54.2	24.2
21	.993	.072	.920	.152	65.7	78.8	55.3	23.5
22	<i>Sunday.</i>							
23	30.025	.121	.965	.156	66.4	78.7	56.1	22.6
24	.023	.120	.958	.162	66.8	79.0	56.4	22.6
25	.005	.095	.938	.157	67.5	79.8	57.0	22.8
26	29.995	.072	.929	.143	69.1	80.6	60.0	20.6
27	30.031	.111	.970	.141	71.1	82.4	63.0	19.4
28	.011	.101	.943	.158	71.3	82.8	61.8	21.0
29	<i>Sunday.</i>							
30	29.936	.016	.879	.137	71.7	82.5	63.4	19.1
31	.945	.019	.884	.135	72.0	83.6	64.4	19.2

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taken at the Surveyor General's Office, Calcutta, in the
month of January, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Date.	Mean Wet Bulb Ther- moneter.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	<i>Sunday.</i>							
2	61.5	3.5	59.4	5.7	.517	5.74	1.28	.835
3	62.6	4.0	60.3	6.3	.532	5.89	1.46	.816
4	63.8	3.9	61.7	6.0	.554	6.12	1.44	.826
5	63.0	4.6	60.5	7.1	.532	5.88	1.66	.798
6	64.2	4.3	61.8	6.8	.558	6.15	1.62	.807
7	64.7	4.0	62.4	6.2	.570	6.28	1.53	.822
8	<i>Sunday.</i>							
9	63.2	4.6	60.6	7.1	.536	5.92	1.69	.803
10	61.4	4.4	58.9	6.9	.506	5.61	1.55	.808
11	59.7	5.0	56.8	8.0	.471	5.23	1.73	.780
12	59.4	4.7	56.6	7.5	.468	5.21	1.59	.790
13	61.5	4.0	59.2	6.4	.513	5.69	1.46	.818
14	62.3	4.6	59.8	7.1	.521	5.76	1.67	.801
15	<i>Sunday.</i>							
16	61.2	5.4	58.1	8.4	.494	5.47	1.90	.768
17	60.7	5.1	57.7	8.1	.486	5.39	1.79	.778
18	60.3	4.5	57.6	7.2	.487	5.40	1.60	.796
19	59.2	5.2	56.1	8.3	.460	5.12	1.78	.774
20	59.5	5.7	56.2	9.0	.463	5.13	1.98	.754
21	60.1	5.6	56.9	8.8	.474	5.25	1.96	.762
22	<i>Sunday.</i>							
23	61.7	4.7	59.0	7.4	.508	5.63	1.71	.797
24	62.4	4.4	59.9	6.9	.525	5.80	1.64	.806
25	63.0	4.4	60.6	6.9	.537	5.92	1.68	.805
26	64.9	4.2	62.6	6.5	.573	6.30	1.65	.816
27	67.0	4.1	64.8	6.3	.615	6.74	1.69	.823
28	66.4	4.9	63.8	7.4	.596	6.53	1.96	.796
29	<i>Sunday.</i>							
30	68.5	3.3	66.8	5.0	.657	7.20	1.38	.858
31	68.9	3.2	67.2	4.8	.666	7.30	1.38	.866

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	30.020	30.092	29.926	0.166	62.5	68.2	58.7	9.5
1	.016	.092	.928	.164	61.5	67.3	57.6	9.7
2	.007	.078	.917	.161	60.8	66.8	56.9	9.9
3	.000	.075	.912	.163	60.3	66.0	56.9	9.1
4	29.997	.076	.913	.163	59.7	65.5	56.1	9.4
5	30.004	.084	.921	.163	59.1	65.2	55.1	10.1
6	.021	.102	.939	.163	58.5	64.4	54.8	9.6
7	.047	.125	.959	.166	58.0	65.0	54.2	10.8
8	.076	.152	.985	.167	60.4	64.8	56.7	8.1
9	.099	.177	30.005	.172	65.0	69.1	60.9	8.2
10	.102	.178	.016	.162	69.3	73.4	64.8	8.6
11	.084	.171	29.991	.180	72.4	76.6	67.8	8.8
Noon.	.050	.126	.970	.156	75.4	80.4	71.7	8.7
1	.014	.092	.934	.158	77.6	82.0	74.4	7.6
2	29.987	.070	.907	.163	78.4	83.4	75.2	8.2
3	.971	.051	.887	.164	78.8	83.6	75.8	7.8
4	.963	.047	.879	.168	76.7	81.8	73.8	8.0
5	.970	.052	.881	.171	75.0	80.1	72.2	7.9
6	.980	.058	.892	.166	71.8	76.8	69.0	7.8
7	.998	.077	.913	.164	69.4	74.0	66.2	7.8
8	30.016	.098	.925	.173	67.5	72.0	64.2	7.8
9	.028	.109	.944	.165	66.0	70.8	62.3	8.5
10	.034	.113	.953	.160	64.7	69.7	61.3	8.4
11	.031	.105	.930	.175	63.7	69.9	60.1	9.8

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta in the
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements
dependent thereon.

Hour.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity, complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Mid- night.	60.6	1.9	59.3	3.2	0.513	5.73	0.65	0.898
1	59.6	1.8	58.2	3.3	.495	.54	.63	.898
2	59.1	1.7	57.7	3.1	.488	.46	.58	.903
3	58.5	1.8	57.1	3.2	.477	.35	.60	.899
4	58.0	1.7	56.6	3.1	.470	.27	.56	.903
5	57.5	1.6	56.1	2.9	.463	.24	.52	.908
6	57.0	1.5	55.6	2.8	.455	.12	.50	.910
7	56.7	1.3	55.5	2.5	.453	.10	.43	.920
8	58.4	2.0	56.9	3.5	.474	.32	.64	.890
9	61.6	3.4	59.4	5.6	.516	.73	1.15	.832
10	64.0	5.4	61.1	8.2	.547	6.02	1.83	.764
11	65.5	6.8	62.1	10.3	.567	.17	2.44	.715
Noon.	66.9	8.5	62.6	12.8	.574	.25	3.20	.660
1	67.9	9.6	63.1	14.5	.584	.32	3.76	.626
2	68.0	10.4	62.8	15.6	.577	.24	4.10	.603
3	68.3	10.5	63.1	15.8	.583	.29	4.17	.601
4	67.2	9.6	62.4	14.4	.569	.18	3.66	.627
5	67.3	7.7	63.4	11.6	.589	.41	2.92	.688
6	66.8	5.0	64.2	7.6	.604	.62	1.85	.781
7	65.4	4.0	63.2	6.2	.585	.44	1.44	.817
8	64.3	3.3	62.3	5.2	.568	.28	1.17	.843
9	63.1	2.9	61.3	4.7	.549	.08	1.01	.857
10	62.2	2.6	60.5	4.2	.535	5.94	0.89	.870
11	61.5	2.3	59.9	3.8	.524	.84	.78	.882

*Abstract of the Results of the Hourly Meteorological Observations
taken at the Surveyor General's Office, Calcutta, in the
month of January, 1854.*

Solar radiation. Weather, &c.

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	<i>Sunday.</i>			
2	130.1	..	N. W. or W.	Cloudless.
3	128.0	..	N. W.	Cloudless till 3 A. M. scattered \i and \i till 7 P. M. cloudless afterwards.
4	126.2	..	Calm or N. W.	Ditto 4 A. M. ditto ditto 5 P. M. ditto.
5	129.8	..	N. N. W. or N. W.	Nearly cloudless the whole day.
6	130.5	..	N. N. W. or N. W.	Cloudless.
7	131.0	..	N. W. or W.	Cloudless till 6 A. M. scattered \i till 6 P. M. cloudless afterwards.
8	<i>Sunday.</i>			
9	133.4	..	N. or N. N. W.	Cloudless nearly the whole day. [wards.
10	130.0	..	N. W. or W.	Cloudless till 11 P. M. scattered \i after-
11	130.4	..	W. or N. W.	Cloudless till 8 A. M. scattered \i till 5 P. M. scattered \i till 8 P. M. cloudless afterwards.
12	127.0	..	Ditto.	Cloudless till 6 A. M. scattered \i or \i or \i till 4 P. M. cloudless afterwards.
13	128.0	..	W. or N.	Cloudless till 3 A. M. scattered \i or \i afterwards.
14	131.2	..	N. or N. W.	Nearly cloudless the whole day.
15	<i>Sunday.</i>			
16	127.0	..	W. or N. W.	[afterwards. Scattered \i till 8 A. M. nearly cloudless
17	133.0	..	N. W.	Cloudless.
18	127.0	..	Ditto.	Ditto.
19	130.7	..	N. W. or W.	Ditto.
20	132.0	..	Ditto.	Ditto.
21	134.0	..	Ditto.	Cloudless till 10 A. M. scattered \i or \i till 6 P. M. cloudless afterwards.
22	<i>Sunday.</i>			
23	135.0	..	W. or N. W. or calm.	Cloudless.
24	132.0	..	Calm or N. W. or S. W.	Cloudless till 6 A. M. scattered \i or \i till 8 P. M. cloudless afterwards.
25	127.0	..	W. or S. W.	Ditto 5 A. M. ditto ditto 6 P. M. ditto.
26	131.0	..	S. W.	Cloudless nearly the whole day.
27	132.0	..	S. W. or N.	Cloudless.
28	134.0	..	S. W. or S. E.	Ditto.
29	<i>Sunday.</i>			
30	135.0	..	S. E. or S.	Cloudless—fogs in the morning.
31	135.0	..	Ditto.	Cloudless with fogs in the morning.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.547	82.3	84.4	66.5	..	..	N. W.	Clear
2	29.517	78.0	79.2	67.9	..	..	N. W.	Ditto
3	29.593	79.8	81.1	68.5	..	..	W.	Ditto
4	29.467	81.0	82.5	66.4	..	..	W.	Ditto
5	29.481	79.0	79.9	64.4	..	..	N. W.	Ditto
6	29.493	80.0	81.0	67.0	..	..	N. W.	Ditto
7	29.474	83.0	83.5	65.0	..	..	N. W.	Ditto
8	29.443	80.9	82.0	66.0	..	..	N. W.	Ditto
9	29.475	79.0	79.9	62.0	..	..	N. W.	Ditto
10	29.533	77.9	78.3	61.5	..	..	N. W.	Ditto
11	29.531	78.0	78.6	62.0	..	..	W.	Ditto
12	29.433	76.5	78.2	65.0	..	..	S. E.	Ditto
13	29.451	74.0	75.0	65.0	..	..	S. E.	Ditto
14	29.483	73.8	75.5	67.6	..	..	S. E.	Ditto
15	29.489	71.0	71.5	61.8	..	..	E.	Ditto
16	29.487	70.9	71.6	62.9	..	..	N. W.	Ditto
17	29.519	67.4	68.4	58.0	..	..	N. W.	Ditto
18	29.591	67.5	68.6	57.3	..	..	W.	Ditto
19	29.559	67.0	69.1	55.5	..	..	W.	Ditto
20	29.593	68.0	69.5	56.0	..	..	N. W.	Ditto
21	29.571	69.0	70.0	56.5	..	..	N. W.	\ scattered
22	29.583	70.1	71.0	57.0	..	..	W.	Clear
23	29.575	68.8	70.0	59.0	..	..	N. W.	\ scattered to W.
24	29.533	68.0	69.0	59.0	..	..	N. W.	Clear
25	29.589	68.0	70.3	59.4	..	..	N. W.	Ditto
26	29.547	69.8	71.9	58.0	..	..	N. W.	Ditto
27	29.445	70.5	71.0	63.5	..	..	N. W.	Ditto
28	29.513	70.0	72.6	59.9	..	..	S.	Ditto
29	29.533	67.0	68.5	58.0	..	..	N.	Ditto
30	29.601	64.5	65.5	54.8	..	..	W.	\ very few in zenith
Mean.	29.522	73.4	74.6	61.7	..	..	..	.....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.515	84.5	85.2	67.2	..	..	N. W.	Clear
2	29.493	79.0	80.4	68.1	..	..	N. W.	Ditto
3	29.513	78.5	79.0	66.0	..	..	W.	Ditto
4	29.451	83.7	85.0	67.0	..	..	N. W.	Ditto
5	29.455	82.8	83.9	65.4	..	..	N. W.	Ditto
6	29.483	82.0	83.0	68.0	..	..	N. W.	Ditto
7	29.459	85.1	85.9	65.6	..	..	N. W.	Ditto
8	29.427	84.6	85.5	67.3	..	..	N. W.	Ditto
9	29.457	82.0	82.6	63.0	..	..	N. W.	Ditto
10	29.493	82.9	83.5	62.9	..	..	N. W.	Ditto
11	29.491	80.0	81.8	63.0	..	..	W.	Ditto
12	29.394	78.9	79.2	66.5	..	..	S. E.	Ditto
13	29.419	76.2	77.0	66.0	..	..	S. E.	Ditto
14	29.425	75.0	76.5	68.0	..	..	S. E.	Ditto
15	29.431	74.2	75.7	62.9	..	..	N. W.	Ditto
16	29.455	75.0	76.0	59.5	..	..	N. W.	Ditto
17	29.505	71.6	72.6	58.9	..	..	W.	Ditto
18	29.551	69.8	69.9	58.2	..	..	W.	Ditto
19	29.515	69.0	70.0	56.0	..	..	N. W.	Ditto
20	29.557	70.0	71.7	56.9	..	..	N. W.	Ditto
21	29.539	74.5	75.0	57.0	..	..	N. W.	scattered
22	29.563	72.8	73.4	58.6	..	..	W.	to E. & N.
23	29.529	73.0	74.2	60.0	..	..	W.	Clear
24	29.523	73.0	74.0	59.9	..	..	N. W.	Ditto
25	29.555	71.0	72.2	60.1	..	..	N. W.	Ditto
26	29.505	72.6	73.5	59.2	..	..	N. W.	Ditto
27	29.405	74.0	75.0	64.6	..	..	N. W.	Ditto
28	29.487	74.0	75.1	60.0	..	..	S.	a few to S. E.
29	29.497	73.0	74.1	59.4	..	..	N.	Clear
30	29.581	72.0	73.9	58.4	..	..	W.	very few in zenith
Mean.	29.489	76.5	77.5	62.5	..	..	..	.....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.

Minimum pressure observed at 4 p. m.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.455	93.8	93.8	69.5	92.9	72.2	82.55	~ scattered	..	N.W.
2	29.411	86.0	86.9	69.5	87.6	68.7	77.7	Clear	..	N.W.
3	29.425	88.0	88.6	67.7	89.0	71.0	75.0	Ditto	..	W.
4	29.405	89.6	89.5	81.0	88.6	70.2	79.4	Ditto	..	N.W.
5	29.395	89.2	89.4	66.3	88.4	68.3	78.35	Ditto	..	N.W.
6	29.421	89.2	89.6	68.5	88.5	69.0	78.75	Ditto	..	N.W.
7	29.393	90.1	89.9	69.0	88.9	63.3	76.1	Ditto	..	N.W.
8	29.369	88.9	89.2	67.4	88.4	71.0	79.7	Ditto	..	N.W.
9	29.403	86.8	86.5	65.0	85.5	67.2	76.35	Ditto	..	N.W.
10	29.445	88.0	88.3	65.0	87.3	64.	75.65	Ditto	..	N.W.
11	29.413	86.0	86.4	65.0	85.4	63.0	74.2	Ditto	..	W.
12	29.309	85.0	85.6	70.2	85.5	65.8	75.65	Ditto	..	S. E.
13	39.351	84.0	85.0	67.5	85.0	63.0	74.0	Ditto	..	S. E.
14	29.385	83.5	84.9	67.3	84.0	61.8	72.9	Ditto.	..	E.
15	29.439	83.8	83.8	69.0	83.0	62.0	72.5	~ scattered	..	E.
16	29.393	79.9	80.5	66.0	78.6	62.0	70.8	Clear	..	N.W.
17	29.459	77.7	77.0	62.0	76.5	58.0	66.75	Ditto	..	W.
18	29.493	77.9	77.8	60.5	77.0	55.9	66.45	Ditto	..	W.
19	29.481	77.5	78.0	59.6	77.0	54.0	65.5	Ditto	..	N.W.
20	29.503	78.5	79.0	58.0	78.2	54.0	66.1	Ditto	..	N.W.
21	29.489	80.0	79.0	60.9	78.8	53.0	65.9	~ scattered	..	W.
22	29.513	78.2	80.0	60.9	79.0	56.0	67.5	Clear	..	W.
23	29.497	77.8	77.3	61.5	77.5	58.	67.75	~ all over	..	N.W.
24	29.475	77.9	78.2	63.0	78.0	58.0	68.0	Clear	..	N.W.
25	29.485	79.5	79.8	61.0	78.6	57.2	67.9	Ditto	..	N.W.
26	29.445	81.6	81.0	62.4	80.0	56.	68.0	Ditto	..	N.W.
27	29.333	78.0	79.2	65.0	79.8	58.0	68.9	Ditto	..	N.W.
28	29.425	78.6	78.2	62.9	80.0	58.0	69.0	~ scattered	..	S.
29	29.471	79.8	79.5	60.9	78.0	58.5	68.25	Clear	..	N.
30	29.541	78.0	77.25	59.0	76.3	56.5	66.4	~ scattered	..	N.W.
Mn.	29.435	83.1	83.4	65.05	82.7	61.72	72.1	....	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.571	66.0	67.4	56.5	..	..	W.	✓ scattered
2	29.575	69.0	70.5	57.0	..	..	S.	Clear
3	29.655	67.0	68.6	56.4	..	..	S. E.	Ditto
4	29.605	68.0	69.0	56.8	..	..	E.	Ditto
5	29.575	69.5	70.0	57.2	..	..	N. W.	Ditto
6	29.591	65.5	67.0	57.3	..	..	N. W.	Ditto
7	29.569	63.5	64.6	52.0	..	..	N. W.	Ditto
8	29.587	62.0	63.3	52.0	..	..	N. W.	Ditto
9	29.543	63.0	64.2	53.0	..	..	N. W.	Ditto
10	29.599	63.0	65.0	54.9	..	..	N. W.	Ditto
11	29.673	63.0	64.6	55.0	..	..	N.	Ditto
12	29.627	62.8	64.0	54.5	..	..	N. W.	Ditto
13	29.669	63.0	65.0	55.2	..	..	N.	Ditto
14	29.589	64.5	66.0	57.0	..	..	W.	Ditto
15	29.625	66.6	68.6	56.8	..	..	W.	Ditto
16	29.623	65.2	67.5	58.2	..	..	W.	Ditto
17	29.675	65.0	66.4	56.8	..	..	N. E.	✓ scattered
18	29.655	63.8	65.0	54.2	..	..	N.	Clear
19	29.615	64.0	66.0	52.0	..	..	W.	Ditto
20	29.665	64.5	65.6	52.0	..	..	N.	Ditto
21	29.605	64.5	65.5	51.9	..	..	W.	Ditto
22	29.655	61.7	63.0	53.3	..	..	W.	Few ☉ to N. and W.
23	29.699	61.2	62.9	53.5	..	..	N. W.	✓ Scattered
24	29.669	61.0	63.0	52.3	..	..	N.	Clear
25	29.649	62.5	64.0	53.0	..	..	N.	☉ all over
26	29.651	65.0	66.0	53.6	..	..	N. W.	✓ scattered
27	29.655	63.6	65.3	52.0	..	..	N. W.	Clear
28	29.741	62.1	63.9	52.0	..	..	W.	Ditto
29	29.681	62.5	63.9	52.0	..	..	W.	Ditto
30	29.641	61.5	63.2	50.6	..	..	N. W.	Ditto
31	29.643	58.0	61.2	49.4	..	..	N. W.	Ditto
Mean.	29.631	64.0	65.5	54.1	.	..	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.551	68.9	69.4	57.5	..	..	W.	∞ to E. and N.
2	29.567	71.0	72.0	57.5	..	..	S.	∧ scattered
3	29.603	72.0	73.0	59.0	..	..	S. E.	Clear
4	29.573	73.0	74.2	59.5	..	..	E.	Ditto
5	29.515	73.0	73.3	58.8	..	..	N. W.	Ditto
6	29.569	69.7	70.3	57.3	..	..	N. W.	Ditto
7	29.531	68.0	69.0	56.0	..	..	N. W.	Ditto
8	29.551	66.8	67.2	53.0	..	..	N. W.	Ditto
9	29.521	68.5	70.4	55.5	..	..	N. W.	Ditto
10	29.559	69.2	71.5	56.0	..	..	N. W.	Ditto
11	29.633	68.0	69.5	57.0	..	..	N.	Ditto
12	29.593	66.9	66.9	55.0	..	..	N. W.	Ditto
13	29.625	67.0	65.6	56.6	..	..	N.	Ditto
14	29.411	66.0	66.2	55.0	..	..	W.	Ditto
15	29.601	70.0	72.0	58.0	..	..	W.	Ditto
16	29.593	70.0	71.0	60.0	..	..	W.	Ditto
17	29.605	70.0	71.5	59.0	..	..	N.	∧ scattered
18	29.625	70.5	71.9	56.5	..	..	N.	Clear
19	29.593	66.0	67.0	53.0	..	..	W.	∞ to W.
20	29.625	66.5	68.0	53.4	..	..	N.	Clear
21	29.591	67.0	66.0	54.0	..	..	W.	Ditto
22	29.627	64.2	65.9	55.0	..	..	W.	Few ∞ to N. and W.
23	29.645	65.0	65.9	55.0	..	..	N. W.	∞ scattered
24	29.593	65.5	66.6	55.6	..	..	N.	Clear
25	29.605	64.0	66.0	56.0	..	..	N.	∧ all over
26	29.631	68.0	69.5	55.3	..	..	N. W.	∞ scattered
27	29.613	65.7	68.0	53.8	..	..	N. W.	Clear
28	29.717	67.0	69.0	53.5	..	..	W.	Ditto
29	29.633	68.0	70.2	53.0	..	..	W.	Ditto
30	29.609	66.5	68.4	51.4	..	..	N. W.	Ditto
31	29.605	65.8	67.5	52.0	..	..	N. W.	Ditto
Mean.	29.591	68.0	69.1	55.7	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.507	74.5	74.5	59.2	55.5	55.5	64.5	~ to E. and N.	..	W.
2	29.507	75.5	74.5	59.8	74.0	55.7	64.85	^ scattered	..	S. E.
3	29.569	76.2	75.0	61.6	75.2	57.0	66.1	Ditto	..	S. E.
4	29.505	76.5	75.6	60.2	76.0	55.5	65.75	Ditto	..	E.
5	29.483	77.7	76.6	60.0	75.5	54.8	65.15	Ditto	..	N. W.
6	29.505	75.5	73.7	56.4	73.5	56.0	64.75	\ scattered towards W.	..	N. W.
7	29.477	73.8	72.5	56.0	71.5	48.5	60.0	Clear	..	N. W.
8	29.499	70.0	69.5	54.3	71.0	48.3	59.65	Ditto	..	N. W.
9	29.473	70.6	71.2	56.9	71.0	48.9	59.95	Ditto	..	N. W.
10	29.493	71.2	72.0	57.6	72.0	54.5	63.25	Ditto	..	N. W.
11	29.563	78.0	76.0	60.5	76.5	56.0	66.25	Ditto	..	N. W.
12	29.505	75.8	75.0	56.0	75.0	56.0	65.50	Ditto	..	W.
13	29.549	76.8	76.0	58.0	77.0	56.0	65.5	Ditto [W.	..	N.
14	29.497	76.6	74.0	60.0	73.0	55.0	64.0	~ a few to	..	W.
15	29.535	77.7	74.5	61.6	74.5	55.0	64.75	Clear	..	W.
16	29.529	78.9	76.9	61.0	76.0	54.5	65.25	Ditto	..	W.
17	29.567	75.5	72.9	60.3	72.5	57.0	64.75	Ditto	..	N. E.
18	29.512	77.2	75.4	58.9	74.0	56.0	65.0	Ditto	..	N.
19	29.541	75.6	73.0	57.7	73.1	50.8	61.95	~ to W.	..	W.
20	29.533	76.0	73.9	55.0	74.0	50.0	62.0	Clear	..	N. W.
21	29.539	76.0	74.0	57.0	73.0	52.0	62.5	Ditto	..	W.
22	29.593	76.0	73.6	58.0	73.0	49.0	61.0	Ditto	..	W.
23	29.619	75.0	72.9	57.3	71.8	51.0	61.4	~ scattered	..	N. W.
24	29.563	76.5	74.9	60.0	73.8	50.0	61.9	Clear	..	N.
25	29.569	75.0	74.0	58.0	73.0	50.5	61.75	^ all over	..	N.
26	29.605	74.5	73.8	57.2	72.8	50.0	61.4	\ scattered	..	N. W.
27	29.571	70.7	70.0	53.0	70.0	52.0	61.0	Clear	..	N. W.
28	29.701	76.0	73.4	57.3	73.0	52.0	62.5	Ditto	..	N.
29	29.601	76.0	74.0	56.0	74.2	51.0	62.6	Ditto	..	W.
30	29.589	75.0	73.1	55.3	72.2	49.0	60.6	Ditto	..	N. W.
31	29.587	75.0	73.0	55.0	73.0	47.5	60.25	Ditto	..	N. W.
Mn.	29.545	75.3	73.9	57.6	73.2	52.7	63.1	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.589	59.8	61.3	50.0	..	..	N. W.	Clear
2	29.575	60.8	62.5	51.4	..	..	N. W.	Ditto
3	29.583	61.7	63.0	53.0	..	..	E.	✓ scattered
4	29.605	59.5	61.3	51.3	..	..	W.	Clear
5	29.663	58.5	60.0	51.0	..	..	W.	Ditto
6	29.685	61.0	62.9	53.7	..	..	S. E.	✓ scattered
7	29.669	62.0	64.2	56.0	..	..	W.	Clear
8	29.649	62.3	64.5	56.0	..	..	W.	Ditto
9	29.643	60.5	61.8	49.0	..	..	N. W.	Ditto
10	29.715	66.5	67.5	54.0	..	..	N. W.	Ditto
11	29.693	60.8	61.6	52.0	..	..	N. W.	✓ scattered
12	29.629	65.0	66.5	54.0	..	..	N. W.	Ditto
13	29.671	61.5	63.0	52.9	..	..	N.	Clear
14	29.651	61.7	62.5	52.8	..	..	W.	~ a few scattered
15	29.637	61.0	62.0	52.0	..	..	N. W.	Clear
16	29.691	59.9	61.9	52.0	..	..	N.	Ditto
17	29.611	60.5	62.6	49.2	..	..	N. W.	Ditto
18	29.625	59.0	60.5	48.9	..	..	N. W.	Ditto
19	29.585	60.7	62.0	49.2	..	..	N. W.	Ditto
20	29.577	61.5	64.1	52.0	..	..	N. W.	Ditto
21	29.605	63.0	65.5	52.4	..	..	W.	Ditto
22	29.651	63.5	65.0	52.7	..	..	W.	Ditto
23	29.637	63.0	66.0	54.0	..	..	W.	Ditto
24	29.609	62.0	63.4	53.0	..	..	W.	✓ a few scattered
25	29.605	63.0	64.5	54.0	..	..	N. W.	Clear
26	29.591	66.5	70.2	59.9	..	..	E.	Ditto
27	29.611	71.6	72.4	60.6	..	..	E.	Ditto
28	29.539	71.9	73.6	61.5	..	..	S. E.	✓ scattered
29	29.569	71.6	73.0	61.6	..	..	E.	✓ a few scattered
30	29.473	69.9	69.0	65.0	..	..	N. W.	✓ all over
31	29.567	59.5	59.0	53.0	..	..	N. W.	Ditto
Mean.	29.619	63.9	64.4	53.5	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.553	64.8	67.0	50.9	..	..	N. W.	Clear
2	29.519	65.9	66.9	52.5	..	..	W.	Ditto
3	29.533	65.8	67.0	54.5	..	..	S. E.	Ditto
4	29.565	63.8	64.1	52.0	..	..	W.	Ditto
5	29.571	63.0	64.5	53.0	..	..	W.	Ditto
6	29.645	65.0	66.8	55.3	..	..	S. E.	✓ scattered
7	29.631	66.2	67.4	56.5	..	..	W.	Clear
8	29.605	66.8	67.5	56.5	..	..	W.	Ditto
9	29.605	66.9	67.2	52.0	..	..	N. W.	Ditto
10	29.685	71.5	72.7	54.5	..	..	N. W.	Ditto
11	29.655	66.0	66.9	53.0	..	..	N. W.	✓ scattered
12	29.613	65.9	66.2	54.8	..	..	N. W.	Ditto
13	29.655	69.2	69.4	54.6	..	..	N.	~ ditto
14	29.605	65.0	66.2	54.6	..	..	W.	Clear
15	29.591	66.0	67.2	55.0	..	..	N. W.	Ditto
16	29.655	66.5	68.4	52.2	..	..	N.	Ditto
17	29.571	56.5	67.2	51.2	..	..	N. W.	Ditto
18	29.550	65.0	66.2	50.7	..	..	N. W.	Ditto
19	29.545	67.0	68.1	52.2	..	..	N. W.	Ditto
20	29.535	68.0	71.0	54.0	..	..	W.	Ditto
21	29.545	66.0	67.4	53.5	..	..	W.	Ditto
22	29.567	65.9	67.0	53.2	..	..	W.	Ditto
23	29.607	69.5	70.8	54.5	..	..	W.	Ditto
24	29.594	63.6	64.5	54.0	..	..	N. W.	✓ a few scattered
25	29.559	71.5	73.3	59.8	..	..	W.	Clear
26	29.555	72.3	73.8	60.3	..	..	E.	Ditto
27	29.547	79.0	80.0	63.3	..	..	E.	Ditto
28	29.491	76.4	79.9	63.2	..	..	S. E.	Ditto
29	29.493	76.2	79.6	63.5	..	..	E.	✓ to E. W. and S.
30	29.435	72.0	72.0	61.5	..	..	N. W.	✓ all over
31	29.521	63.6	63.3	57.2	..	..	N. W.	✓ to E. and S. in horizon.
Mean.	29.574	67.8	69.0	55.3	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Jan. 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.493	74.6	74.0	53.0	74.0	47.0	60.5	Clear	..	N.W.
2	29.523	71.5	69.0	55.0	70.0	47.0	51.1	✓ scattered	..	W.
3	29.509	71.3	69.0	54.7	69.0	51.5	60.25	Clear	..	S.
4	29.559	71.5	70.0	55.9	69.5	46.8	58.65	Ditto	..	W.
5	29.547	70.0	69.0	56.0	69.0	49.5	59.25	Ditto	..	W.
6	29.609	71.0	68.6	57.0	69.0	51.5	60.25	✓ to E.	..	S. E.
7	29.493	76.6	74.0	57.7	72.0	53.8	62.9	Clear	..	W.
8	29.561	75.2	74.0	56.0	73.2	51.2	62.2	Ditto	..	W.
9	29.577	75.6	74.9	56.5	74.0	49.5	61.75	Ditto	..	N.W.
10	29.625	77.0	75.6	58.5	75.0	49.0	62.0	Ditto	..	W.
11	29.591	75.0	74.0	56.0	74.0	51.0	62.5	✓ scattered	..	N.W.
12	29.587	70.5	69.6	50.0	72.0	50.8	61.4	✓ all over	..	N.W.
13	29.591	72.5	71.5	57.7	71.0	53.0	62.0	✓ a few in horizon	..	N.
14	29.597	73.0	72.0	57.9	71.6	51.0	61.3	Clear	..	W.
15	29.525	73.0	72.0	56.0	72.2	50.0	61.1	Ditto	..	W.
16	29.615	73.0	72.0	54.5	71.6	49.5	60.55	Ditto	..	N.
17	29.537	72.0	72.0	53.5	71.0	49.9	60.45	Ditto	..	N.W.
18	29.541	71.0	71.0	52.9	70.0	50.0	60.0	Ditto	..	N.W.
19	29.489	71.0	73.5	55.2	72.8	49.0	60.9	Ditto	..	N.W.
20	29.505	74.0	72.9	52.9	73.9	51.0	62.45	Ditto	..	W.
21	29.515	74.2	73.5	54.0	74.0	51.0	62.5	Ditto	..	W.
22	29.493	73.8	73.0	53.6	74.3	51.2	62.75	Ditto	..	W.
23	29.571	75.0	76.2	57.0	76.0	51.0	63.5	Ditto	..	W.
24	29.547	67.0	69.5	57.5	70.0	54.0	62.0	✓ scattered	..	W.
25	29.499	75.5	76.7	59.7	75.8	56.0	65.9	Clear	..	W.
26	29.507	79.9	79.8	64.0	80.0	52.0	66.0	Ditto	..	E.
27	29.509	82.0	82.4	65.0	81.5	61.0	71.25	Ditto	..	N. E.
28	29.413	83.6	83.2	65.5	83.2	60.5	71.85	✓ in hor. to S.E. & W.	..	S.E.
29	29.421	83.5	83.0	65.7	83.0	64.0	73.5	✓ scattered	..	E.
30	29.389	75.6	74.8	62.7	74.6	63.6	69.1	✓ all over	..	N.W.
31	29.509	69.5	66.9	55.8	66.5	58.2	62.35	✓ to E. and S. in hor.	0.5	N.W.
Mn.	29.531	74.3	73.5	57.0	73.3	52.4	62.8	..	0.5	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of February, 1854.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.561	57.7	57.9	46.0	..	..	N. W.	✓ scattered
2	29.479	54.9	55.3	45.4	..	..	N. W.	Clear
3	29.521	57.5	58.5	47.4	..	..	W.	Ditto
4	29.525	59.7	61.0	50.5	..	..	S. E.	✓ all over
5	29.569	59.8	60.2	50.5	..	..	E.	✓ scattered
6	29.565	58.9	59.5	50.0	..	..	W.	Clear
7	29.633	57.3	59.0	49.5	..	..	W.	Ditto
8	29.621	64.0	66.0	62.0	..	..	..	✓ scattered
9	29.491	65.0	67.3	53.4	..	..	N. W.	Clear
10	29.355	69.0	69.3	58.5	..	..	E.	Hazy
11	29.495	62.7	64.5	55.5	..	..	E.	Clear
12	29.483	63.5	64.2	54.6	..	..	E.	✓ scattered
13	29.475	65.0	67.0	54.3	..	..	E.	✓ all over
14	29.415	62.5	63.0	57.4	..	..	S. E.	Clear
15	29.571	65.0	66.0	59.0	..	..	E.	✓ very few scattered
16	29.599	67.7	69.0	58.5	..	..	S. E.	✓ scattered
17	29.663	67.7	69.3	57.7	..	..	E.	Clear
18	29.765	65.0	66.0	61.6	..	..	E.	✓ to E. and N.
19	29.661	65.6	65.9	61.0	..	..	W.	Clear
20	29.639	65.5	65.5	62.0	..	..	N. W.	✓ scattered all over
21	29.647	67.8	68.5	58.2	..	..	N. W.	✓ scattered
22	29.605	64.6	65.2	58.0	..	..	E.	✓ a few scattered
23	29.591	65.3	66.2	62.2	..	..	E.	✓ all over
24	29.627	67.8	68.0	62.0	..	..	E.	Hazy to E.
25	29.547	70.0	70.4	62.5	..	..	N.	✓ scattered
26	29.507	68.0	68.5	60.0	..	..	E.	✓ scattered
27	29.467	68.5	69.0	58.2	..	..	N. W.	Clear
28	29.433	71.5	72.5	58.0	..	..	N. W.	Ditto
Mean.	2 9554	64.2	65.1	56.2	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.531	62.0	62.2	48.4	..	..	N. W.	~ scattered
2	29.439	60.0	60.7	49.5	..	..	N. W.	Clear
3	29.483	61.9	62.4	50.6	..	..	W.	Ditto
4	29.497	62.8	64.0	51.7	..	..	S. E.	~ all over
5	29.523	64.0	64.6	51.0	..	..	E.	~ scattered
6	29.505	63.9	63.9	49.2	..	..	W.	Ditto
7	29.599	64.0	66.3	50.8	..	..	W.	Clear
8	29.577	68.0	69.0	51.5	..	..	..	Ditto
9	29.431	69.0	70.8	53.9	..	..	S. W.	Ditto
10	29.339	70.9	70.7	60.5	..	..	W.	Ditto
11	29.431	64.0	64.0	57.0	..	..	E	Ditto
12	29.445	68.0	69.4	56.0	..	..	E.	~ scattered
13	29.435	69.8	71.0	56.2	..	..	N. W.	~ all over
14	29.401	64.8	65.5	58.8	..	..	S. E.	Clear
15	29.539	67.6	68.4	58.4	..	..	E.	~ very few scattered
16	29.561	69.0	70.8	59.5	..	..	S. E.	~ scattered
17	29.645	72.5	73.8	60.5	..	..	S.S.E.	~ ditto
18	29.725	70.0	70.3	62.1	..	..	N. W.	Clear
19	29.627	70.8	71.0	61.9	..	..	W.	Ditto
20	29.601	68.0	68.3	63.2	..	..	N. W.	~ scattered all over
21	29.605	70.6	71.4	59.1	..	..	N. W.	~ scattered
22	29.575	69.5	70.3	60.5	..	..	E.	~ all over
23	29.567	68.5	68.7	63.4	..	..	E.	~ scattered
24	29.587	71.5	72.3	63.4	..	..	W.	~ scattered
25	29.455	73.0	73.5	64.0	..	..	N. E.	~ ditto
26	29.493	69.9	70.2	61.2	..	..	N. E.	~ ditto
27	29.445	73.0	73.3	57.4	..	..	W.	~ scattered in zenith
28	29.411	76.5	77.5	59.5	..	..	N. W.	Clear
Mean.	29.517	68.0	68.7	57.1	..	..	..	..

Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	3 Ft. 2 In. from the ground.	Rain Gauges.	Direction of the Wind.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.				
1	29.455	67.0	66.0	50.5	66.0	51.0	58.5	~ scattered	..	N.W.	
2	29.405	64.0	64.6	49.6	64.0	44.5	54.25	Clear	..	N.W.	
3	29.445	68.0	68.0	51.5	67.0	45.0	56.0	Ditto	..	N.W.	
4	29.429	66.0	66.5	52.5	66.0	45.0	55.5	~ all over	..	S. E.	
5	29.473	67.5	67.0	53.0	67.0	46.0	56.5	~ scattered	..	E.	
6	29.465	67.9	67.6	52.0	68.2	46.0	57.1	Ditto	..	W.	
7	29.567	69.0	68.6	54.0	68.0	47.5	57.75	Clear	..	W.	
8	29.505	74.0	73.0	53.6	73.6	49.5	61.05	Ditto	..	W.	
9	29.403	76.0	75.4	57.4	75.0	53.0	64.0	~ all over	..	S. W.	
10	29.329	73.2	73.0	60.8	72.8	53.0	62.9	Clear	..	W.	
11	29.391	71.6	71.2	59.5	71.0	51.0	61.0	Ditto	..	E.	
12	29.405	75.0	74.6	57.2	72.2	51.0	61.6	~ scattered	..	E.	
13	29.325	67.7	67.0	55.3	69.5	56.0	62.75	Ditto	..	E.	
14	29.329	66.0	66.9	59.6	66.5	51.0	58.75	~ to N. and W.	..	S. E.	
15	29.455	71.5	71.5	58.5	71.0	52.0	61.5	~ scattered	..	S. E.	
16	29.505	72.2	72.0	60.2	72.0	56.5	64.25	~ ditto	..	S. E.	
17	29.605	74.2	74.9	61.8	74.0	60.0	67.0	~ ditto	..	S. E.	
18	29.699	75.5	75.8	63.3	77.0	64.5	70.75	Clear	..	N.W.	
19	29.591	75.9	76.2	62.6	76.0	62.6	69.3	Ditto	..	W.	
20	29.539	72.6	72.6	64.6	72.6	57.5	65.05	~ scattered all over	..	N.W.	
21	29.513	74.8	74.2	60.0	75.0	57.5	66.25	~ scattered	..	S. E.	
22	29.535	71.0	71.0	59.0	74.0	62.8	68.4	~ all over	..	E.	
23	29.525	72.4	72.0	63.8	71.5	60.0	65.75	Ditto	..	E.	
24	29.521	75.6	75.4	65.1	75.0	61.0	68.0	~ scattered	..	N.W.	
25	29.405	76.7	76.7	66.5	76.5	65.0	70.75	Ditto	..	N. E.	
26	29.437	74.0	75.4	64.0	75.5	62.6	69.05	Ditto	..	N. E.	
27	29.375	79.0	78.0	61.0	78.0	59.0	68.5	Clear	..	N.W.	
28	29.351	82.7	83.0	63.8	82.2	73.0	77.6	Ditto	..	N.W.	
Mn.	29.464	72.2	72.1	58.6	72.0	55.1	63.5	..	..	..

